SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 11
JUNE 1, 1974

W74-05401 -- W74-05950

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WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
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02 WATER CYCLE
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

SIMULATION OF THE HYDROLOGY OF UNGAGED WATERSHEDS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
L. F. Huggins, J. R. Burney, P. S. Kundu, and E. J. Monke.
Available from the National Technical Information Service as PB-229 670, $3.75 in paper copy, $1.45 in microfiche. Purdue University Water Resources Research Center Technical Report No. 38, 1973. 70 p, 20 fig, 3 tab, 6 ref, 1 append. OWRR B-016-IND(2).

Descriptors: *Watersheds(Basins), *Hydrologic models, *Simulation analysis, *Rainfall-runoff relationships, *Small watersheds, *Overland flow, Roughness, Roughness coefficient, Hydrographs, Surface waters, Topography, Slopes, Hydraulics, Mathematical models, Runoff, Physical properties, *Distribution patterns.
Identifiers: Distributed analysis, Distributed parameters, Watershed modelling, Power spectral analysis, Surface roughness, Overload flow.

A watershed model is developed capable of predicting hydrologic behavior of a natural watershed for which data concerning historical relationships between rainfall and runoff events are unavailable. The computer program used to implement the model together with sample data and its output is given in an appendix. The model uses a distributed analysis approach and involves the subdivision of a catchment into a grid of small elemental areas, the mathematical characterization or modelling of the various physical processes occurring within each element and the numerical integration of the responses from each watershed element into a comprehensive description of not only the discharge at the outlet, but of the complete hydrologic response of every element of which the catchment is composed. The primary advantages of the distributed watershed model are its potential for increased accuracy due to its inherent capability to evaluate spatially variable factors within a watershed and its comprehensive description of the total watershed behavior. This latter advantage is of increasing importance in providing a means of evaluating the potential environmental effects of alternate programs for resource development. The primary disadvantage of distributed models is the greatly increased computational effort required to utilize them.
W74-05403

EVAPORATION, INFILTRATION AND RAINFALL-RUNOFF PROCESSES IN URBAN WATERSHEDS,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
A. Hossain, J. W. Delleur, and R. A. Rao.
Available from the National Technical Information Service as PB-229 642, $4.00 in paper copy, $1.45 in microfiche. Technical Report No. 41, 1974. 46 p, 35 fig, 13 tab, 41 ref. OWRR B-022-IND(2).

Descriptors: *Urban runoff, *Urban hydrology, *Evaporation, *Infiltration rates, *Rainfall-runoff relationships, *Precipitation excess, Urban drainage, Consumptive use, Energy budget, Evaporation pans, Latent heat, Water balance, Infiltration, Antecedent precipitation, Retention, Soil properties, Unit hydrographs, Model studies, Mathematical models.
Identifiers: van Bavel's evaporation formula, Kohler's evaporation formula, Blaney-Criddle evaporation formula, Blaney-Morin evaporation formula, MIT watershed model, Minnesota watershed model, Holtan watershed model, Multicapacity Basin Accounting Model, Antecedent Retention Index Model, Instantaneous Unit Hydrograph, Non-Linear Deterministic Model, Quasi-Linear Model.

Most rainfall-runoff models use rainfall excess as the input. Testing methods for estimating the rainfall excess, evaluating linear and nonlinear systems models for urbanizing areas, and developing a model of the rainfall excess-direct runoff transfer were the objectives of the study. For evaporation, the van Bavel formula was the best model, however if the meteorological data were unavailable, the Blaney-Morin gave good results. The constant diffusivity form of the unsteady flow equation for the flow in porous media was solved making use of the linear systems approach, and an impulse response function was obtained for the relative soil moisture change. Five models were examined as to their application for urban watersheds. The Antecedent Retention Index Model gave the best estimate of the total rainfall excess and the MIT Model gave the best prediction of the time distribution. A quasi-linear model of the rainfall-runoff transfer was developed. The model was tested by predicting the direct runoff of an urban watershed, from which data were not used for the calibration and the performance was found to be very satisfactory. The data for the study were obtained from eleven urban watersheds in Indiana, Texas, and Illinois.
W74-05405

DETERMINATION OF DISCHARGE-FREQUENCY RELATIONSHIPS UTILIZING NON-LINEAR HYDROGRAPHS AND A MODIFIED RATIONAL FORMULA,
Kansas Water Resources Research Inst., Manhattan.
R. L. Smith, K. E. Larson, and M. G. Berry.
Available from the National Technical Information Service as PB-230 036, $11.25 in paper copy, $1.45 in microfiche. KWRRI Contribution No. 126. September 1973. 165 p, 30 fig, 24 ref. OWRR B-022-KAN(1). 14-31-0001-3283.

Descriptors: *Hydrographs, *Kansas, *Hydrograph analysis, *Flood frequency, Rainfall intensity, Watersheds(Basins), Methodology, Storms.
Identifiers: *Non-linear hydrographs, *Frequency-equivalent storms.

A new methodology for calculating flood frequency relationships is presented. Input data requirements are the normal watershed parameters of length, slope and area plus the point rainfall intensity-duration-frequency curve for the specified geographic location. Initial testing on 60 Kansas basins ranging in size from less than one square mile to more than 1,000 square miles gave results which compared favorably with other available techniques. The methodology provides for the determination of a frequency-equivalent storm having a uniform rainfall excess intensity. This storm is converted to a triangular hydrograph having a frequency-equivalent peak discharge and a base length equal to the time of concentration plus the storm duration. The overall approach has been termed the Frequency-Equivalent Non-Linear Hydrograph (FENLH) method. In Kansas, the rainfall excess intensity of the frequency-equivalent storms was found to follow a log normal distribution. For a given basin, the percentage attenuation in peak flow due to the effect of basin storage was found to be essentially constant at frequency-equivalent conditions. Both the slope (variance) of the probability distribution of log X and the time of concentration are directly related to the rate of change in the watershed resistance parameter (BN). BN is a function of the Reynolds number, but its rate of change is also influenced by basin loss characteristics. A procedure for adapting the method to the determination of flood frequency relations in urban basins is presented. Procedures to be followed in utilizing the FENLH hydrograph parameters in reconstituting variable intensity storms are described.
W74-05406

AN EMPIRICAL MATHEMATICAL MODEL OF AN INTERCONNECTED WATERSHED SYSTEM,
Pennsylvania State Univ., University Park. Dept. of Industrial Engineering.
D. L. Raphael, and B. M. Tallman.
Available from the National Technical Information Service as PB-229 830 $7.00 in paper copy, $1.45 in microfiche. Institute for Research on Land and Water Resources, Pennsylvania State University, research project technical completion report, February, 1974. 72 p, 15 fig, 18 tab, 6 ref. OWRR A-022-PA(1). 14-31-0001-4038.

Descriptors: *Watersheds(Basins), *Mathematical models, Evapotranspiration, Hydrographs, Model studies, Seepage, Flow, *Forecasting, *Hydrograph analysis, *Rainfall-runoff relationships, *Algorithms.
Identifiers: *Response surface mapping, Absorbing sectors, Seepage loss.

The problem of prediction of surface flow hydrographs resulting from excess rainfall was investigated by applying Response Surface Mapping techniques to estimate parameters as a function of time. An empirical model with two absorbing sectors (surface flow and the sun of the evapotranspiration and seepage loss) was developed and applied to a complex system of interconnected watersheds using hypothetical data and parameters. The model techniques were also applied to predict a surface flow hydrograph for a single real world watershed.
W74-05543

SURFACE-GROUNDWATER RELATIONSHIPS IN CENTRAL MONGOLIA (VZAIMOSVYAZ' POVERKHNOSTNYKH I GRUNTOVYKH VOD V TSENTRAL'NOY MONGOLII),
Proizvodstvennyi i Nauchno-Issledovatelskii Institut po Inzhenernym Izyskaniyam v Stroitelstve Gosstroya, Moscow (USSR).
A. F. Krashnikov.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 5, p 92-96, September-October 1973. 1 fig, 1 tab, 8 ref.

Descriptors: *Surface-groundwater relationships, *Water resources, *Surface waters, *Groundwater, Streamflow, Runoff, Rainfall-runoff relationships, Mountains, Estimating.
Identifiers: *USSR(Mongolia).

Characteristics of surface waters and groundwater in Central Mongolia are examined, and estimates are made of water resources of the area. Large supplies of water, both surface and ground, are concentrated in the Hangayn-Henteyn (Kentei Shan) folded mountain region. Natural groundwater resources drained by the hydrographic network of rivers in the region are 6.6 cu km/yr, which is 30% of the local streamflow estimated at 22.1 cu km/yr. The Selenge and Onon basins, which occupy 58% of the area of the Hangayn-Henteyn fold mountains, contain three-fourths (4.68 cu m/yr) of the groundwater resources of this most water-abundant region of Mongolia. The groundwater contribution to streamflow in the Hangayn-Henteyn mountains, including the Selenge (Arctic Ocean) basin, the Pacific Ocean basin, and closed basins of Central Asia is tabulated. (Josefson-USGS)
W74-05561

WATERSHED MODELS: TOOLS IN PLANNING LAND MANAGEMENT FOR WATER AND POLLUTION CONTROL,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
C. B. England.

Journal of Soil and Water Conservation, (Vol 28), p 36-38, January-February 1973. 4 chart, 2 illus, 4 ref.

Descriptors: *Water, *Land management, *Hydrologic data, *Model studies, *Hydrologic models, Water utilization, Evapotranspiration control, Non-structural alternatives, Watershed management, Zoning, Watersheds(Basins), Agricultural watersheds, Groundwater basins, Analytical techniques, Research and development.

All phases of the hydrologic cycle are involved in the disposition of wastes on agricultural land. Infiltration, storage, movement of water in the soil, surface detention and runoff, evapo-transpiration, groundwater recharge and channel processes all influence the fate of any material applied to a soil. Because of the complex interdisciplinary nature of predicting watershed performance, comprehensive mathematical models have been developed in agricultural hydrology. Through manipulation of parameters controlling the prediction computations, quick and efficient evaluation of potential effects of management alternatives can be made, thus optimizing the design of control measures to achieve a specified result. These models can provide aid to understanding and predicting water movements within agricultural watersheds. Since they can be employed to determine the movement of dissolved or suspended pollutants, if they are constructed in such a way that land management effects are predictable, they can become a useful tool in pollution control planning. (Ritchie-Florida)
W74-05570

DEVELOPING SIMULATION MODELS,
McMaster Univ., Hamilton (Ontario). Dept. of Civil Engineering and Engineering Mechanics.
W. James.
Water Resources Research, Vol 8, No 6, p 1590-1592, December, 1972. 3 fig, 1 ref.

Descriptors: *Mathematical models, *Computer models, *Systems analysis, *Model studies, *Simulation analysis, Operations research, Synthetic hydrology, Scheduling.

Simulation models are commonly resolved in time and space beyond the integrity of available field observations. Input data are judged accordingly, and, ultimately, expensive simulation models coexist with inadequate data bases. Such manipulation is necessary in sensitivity analysis, but a compromise between data collection and model extrapolation must be found. The rationale for the systematic development of a simulation model and the concomitant data collection program is presented and should be useful for managing difficult simulation studies. (Skogerboe-Colorado State)
W74-05672

ROLE OF MODELS IN GROUNDWATER MANAGEMENT,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 4B.
W74-05680

SPECTRAL ANALYSIS AND ITS APPLICATION TO HYDROLOGIC TIME SERIES OF LOWER OHIO TRIBUTARIES,
Purdue Univ., Lafayette, Ind.
H. L. Shahabian.
Available from National Technical Information Service as PB-230 241, $9.75 in paper copy, $1.45 in microfiche. Thesis, 1973, 118 p, 24 fig, 10 tab, 22 ref, append. OWRR-B-036-IND(3).

Descriptors: *Rainfall-runoff relationships, *Simulation analysis, *Stochastic processes, *Time series analysis, Precipitation, Rain, Runoff, Hydrographs, Evapotranspiration, Probability, Mathematical studies, *Ohio River, *Regression analysis.
Identifiers: *Spectral analysis.

Objectives were to develop different models for the rainfall and runoff sequences and of rainfall-runoff processes for several watershed tributaries to the Ohio River. The models developed for the monthly data followed two different approaches, namely, spectral analysis and the ARIMA (autoregressive integrated moving average) procedure. Spectral analysis is applied to develop a model for the monthly runoff sequence. The autoregressive scheme is adequate to represent the normalized standardized monthly sequences. A comparison of the spectral and parametric estimation of the model parameters is performed for their respective generating capabilities. The monthly rainfalls are analyzed using the same spectral technique. The normalized standardized series do not differ sensibly from a white noise or uncorrelated random variables. The rainfall-runoff relationship is analyzed by the cross-spectral technique and it is found that the linear system for the two series does not explain the relationship adequately.
W74-05820

MODELS OF SPRING RUNOFF FORMATION AND PROBLEMS IN THEIR USE FOR FORECASTING THE FLOOD HYDROGRAPH,
Gidrometerologicheskii Institut, Leningrad (USSR).
A. P. Zhidikov, A. G. Levin, N. S. Nechayeva, and Ye. G. Popov.
Soviet Hydrology: Selected Papers, No 3, p 240-249, 1972. 3 fig, 5 ref. Translation of Transactions of the Hydrometeorological Research Center of the USSR (Trudy GMTs), No 81, p 33-45, 1972.

Descriptors: Model studies, *Flood forecasting, *Hydrograph analysis, *Snowmelt, *Runoff, Water equivalent, Hydrologic budget, Inflow, Discharge(Water), Variability, Equations.
Identifiers: *USSR(Oka River), Nomograms, *USSR(Neya River).

Although several models have been developed in the USSR in the last 15-20 years for computation of individual items in the hydrologic budget and of the hydrograph as a whole, they have not found wide application in hydrologic computations and forecasts. A method is investigated for forecasting a flood hydrograph by computing snowmelt at the outlet gaging station of a drainage basin, 4,000 to 6,000 sq km in area. Models were tested on initial data for the Oka River upstream from Orel and for the Neya River upstream from Buslayevo village for 1949-65 and 1936-65, respectively. The drainage area of the Oka River is 4,900 sq km; it is well drained by a ravine-gully network and is unwooded. The drainage area of the Neya River is 5,700 sq km and is 80% covered by forests. The flood hydrograph was derived by computer according to programs designed for 4 modifications of the models. In one modification the rate of snowmelt was computed for open and wooded parts of the basins from snowmelt coefficients. In three modifications the rate of snowmelt in the forest was computed from the snowmelt coefficient, and the rate of snowmelt in the open, from formulas. These modifications further took into account the regulation of temporary meltwater runoff on the basin surface. (Josefson-USGS)
W74-05842

THE ROLE OF SOIL WATER IN THE HYDROLOGIC BEHAVIOR OF UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 2G.
W74-05913

2B. Precipitation

MANUAL FOR ESTIMATION OF PROBABLE MAXIMUM PRECIPITATION.
World Meteorological Organization, Geneva (Switzerland).
Operational Hydrology Report No 1, 1973. 190 p, 2 append.

Descriptors: *Probable maximum precipitation, *Estimating, Meteorology, Cloud physics, Statistical methods, Depth-area-duration analysis, *Precipitation intensity, Weather data, *Publications, *Climatic data.

Procedures for estimating probable precipitation (PMP) cannot be standardized as they vary with amount and quality of data available, basin size and location, basin and regional topography, storm types producing extreme precipitation, and climate. This manual discusses procedures that have been found generally applicable in the middle latitudes for basin sizes up to about 50,000 sq km in orographic and nonorographic regions. The examples given cover estimates for specific basins and generalized estimates, and include PMP estimates for thunderstorms, general storms, and tropical storms. All procedures described except one are based on the meteorological, or traditional, approach. The one exception is a statistical procedure. The traditional approach consists essentially of moisture maximization and transposition of observed storms. Wind maximization is sometimes used. Storm transposition involves adjustments for elevation, moisture-inflow barriers, and distance from the moisture source. These adjustments are founded on hypothetical storm models. A variation of the traditional approach is the use of an orographic computation model in mountainous regions. Methods are described for determining the seasonal variation and chronological and areal distribution of PMP. Tables of precipitable water in a saturated pseudoadiabatic atmosphere are included for making various adjustments involving atmospheric moisture. Also included are world record and near-record rainfalls that may be used for making rough assessments of derived PMP estimates. (Knapp-USGS)
W74-05524

DESCRIPTION OF PRECIPITATION CYCLES IN THE USSR AND THEIR RELATION TO GENERAL CIRCULATION CYCLES,
O. A. Drozdov, and A. S. Grigor'yeva.
Soviet Hydrology: Selected Papers, No 1, p 57-64, 1972. 4 fig, 6 tab, 6 ref. Translated from Third All-Union Conference on General Circulation of the Atmosphere (Trudy 3-ey Vsesoyuznoy konferentsii po obshchey tsirkulyatsii atmosfery), p 87-96, 1972.

Descriptors: *Precipitation(Atmospheric), *Air circulation, *Cycles, Correlation analysis, Seasonal.
Identifiers: *USSR.

Statistical structure of time series of atmospheric precipitation over large areas of the USSR was investigated for territorial distribution of cycles and its correlation with similar air circulation characteristics. Data of 77 stations for 1891-1960 for cold (November-March) and warm (April-October) periods of the year were used. Cycles at 4 stations (Leningrad, Tbilisi, Barnaul, and Nerchinskiy Zavod) were investigated for 1830-90. A 2- to 3-year cycle is generally observed in both precipitation and circulation. A 6- to 7-year cycle is encountered more often in precipitation than in circulation (particularly during the warm period), while 8- to 9- and 10- to 11-year cycles frequently associated with circulation are replaced by 9- to 10- and 12- to 13-year precipitation cycles. A 14- to 15-year cycle is observed in both precipitation and circulation, and cycles of 19 and 20 to 22 years are better defined in precipitation than in circulation characteristics. A cycle of 60 to 80 years is as-

sociated with both circulation and precipitation. Cycles are more clearly defined in the amount of precipitation. The contribution of cycle components to long-period variations in the amount of precipitation is significant. (Josefson-USGS)
W74-05566

RELATIONSHIP BETWEEN CLIMATOLOGICAL VALUES OF AIR TEMPERATURE AND AMOUNT OF PRECIPITATION,
K. V. Pyatygina.
Soviet Hydrology: Selected Papers, No 1, p 18-21, 1972. 1 fig, 1 tab, 7 ref. Translated from Voyeykov Main Geophysical Observatory (Trudy GGO), No 273, p 61-65, 1972.

Descriptors: *Climatology, *Meteorology, *Precipitation(Atmospheric), *Air temperature, Correlation analysis.
Identifiers: *USSR.

Correlations between long-period average temperature and precipitation values and between their anomalies reflect the general mechanism of climate formation. Since the coefficients of correlation between temperature and precipitation anomalies were found to be much lower than between long-period average values of these meteorological elements, it may be assumed that the results obtained for normal values are conclusive in this mechanism of climate formation, while those obtained for anomalies are a peculiar manifestation of this mechanism. This factor must be considered in developing a climatic theory. (Josefson-USGS)
W74-05568

CLIMATIC DESCRIPTION OF DEW IN THE EUROPEAN USSR,
Main Geophysical Observatory, Leningrad (USSR).
V. N. Karpenko.
Soviet Hydrology: Selected Papers, No 3, p 264-268, 1972. 3 fig, 1 tab, 3 ref. Translation of Transactions of the Voyeykov Main Geophysical Observatory (Trudy GGO), No 288, p 150-155, 1972.

Descriptors: Climatology, *Dew, *Air temperature, Maps, *Time series analysis, *Climatic data.
Identifiers: *European USSR, *Isolines.

Average dates of the beginning and end of dew formation from 1959 to 1965 were calculated from results of daily observations at 100 stations in different regions of European Russia. To estimate the reliability of the 7-year series, dates of the beginning and end of dew formation were calculated for 11 stations for a 20-year period (1950-69). Relations were established between average dates of dew formation and average daily air temperature on the data of dew formation and between duration of the period of possible dew formation and dates of its beginning and end. In northern and northwestern regions dew begins to form as air temperature crosses 7-8 deg C. In Estonia, Latvia, Belorussia, most of the Ukraine, and central and eastern regions of European Russia, it forms at 5-6 deg C. In Lithuania, Moldavia, and the Stavropol' and Krasnodar Territories dew begins to form when air temperature crosses 3-4 deg C. The greatest difference between the average dates of dew formation observed over a 20-year period and the calculated dates is 4 days, and that between the dates of the end of dew formation is 6 days. The difference between the actual and calculated duration of the period of possible dew formation is 9 days. In northern regions, the average duration of the period of possible dew formation is approximately 120 days, beginning in late May and ending during the last 10 days of September. The duration of this period increases southward, reaching 240 days in the southern Ukraine and Northern Caucasus. Average duration of the possible period of dew formation and dates of its beginning and end are tabulated for 11 stations in European Russia, and average duration of the possible period of dew formation and dates of its beginning and end are mapped. (Josefson-USGS)
W74-05839

AMOUNT OF DEW IN THE USSR, ACCORDING TO A DEW RECORDER,
Main Geophysical Observatory, Leningrad (USSR).
V. N. Karpenko.
Soviet Hydrology: Selected Papers, No 3, p 260-263, 1972. 1 fig, 1 tab, 12 ref. Translation of Transactions of the Voyeykov Main Geophysical Observatory (Trudy GGO), No 288, p 144-149, 1972.

Descriptors: *Dew, Measurement, Climatic data, Distribution patterns.
Identifiers: *USSR, *Dew gages.

To exclude the effects of varying duration of the warm season at different latitudes, the amounts of dew in the USSR were calculated for a 5-month period from May through September. The largest amount of dew, about 4-6 mm, is observed in the Baltic States, the Pskov, Novgorod, and Leningrad Oblasts, Belorussia, the Upper Volga Region, and in the western Ukraine. The amount of dew decreases markedly from northwest to southeast in European Russia. In the Central Russian Uplands, the southeastern Ukraine, the Stavropol' and Krasnodar Territories, and in Rostov Oblast, the amounts of dew measured by a dew gage in May-September are about 2-3 mm. Dew values decrease to 1 mm over most of the lower Volga Region but increase considerably on the Black Sea coast of the Caucasus and in foothills of the Northern Caucasus. The amount of dew in Tadzhikistan in May-September is 2 mm. In the Lena Valley of the Yakutsk ASSR, dew values reach 2-3 mm. In Chita, Irkutsk, Ulan-Ude, and Krasnoyarsk dew yields 3-4 mm of water. Dew in the Maritime Territory in May-September yields as much as 5-6 mm of water. In most cases, average daily dew precipitation in the USSR is about 0.1 mm. Annual dew precipitation in the Baltic States, Belorussia, most of the Ukraine, and in central regions of European Russia is 8-12 mm, and in Upper and Central Volga Regions and Stavropol' and Krasnodar Territories it is 6-8 mm. North of 60 deg N and in the Lower Volga Region dew values decrease to 3-5 mm. The geographic distribution of dew in May-September over the USSR (in mm) is mapped, and the average number of days with dew per year is tabulated for 34 stations in the country. (Josefson-USGS)
W74-05840

PROBLEM OF DETERMINING PRECIPITATION FALLING ON MOUNTAIN SLOPES,
Main Geophysical Observatory, Leningrad (USSR).
L. R. Struzer.
Soviet Hydrology: Selected Papers, No 2, p 129-142, 1972. 5 fig, 5 tab, 1 ref. Translation of Transactions of the Voyeykov Main Geophysical Observatory (Trudy GGO), No 280, p 134-149, 1972.

Descriptors: *Precipitation(Atmospheric), *Rainfall disposition, *Raindrops, *Slopes, *Mountains, Valleys, Watersheds(Divides), Winds, Rain gages, Equations.

Quantitative criteria were established for dimensions of a mountain basin, and methods were developed for computing differences in precipitation occurring on opposite slopes of a mountain valley. Three different planes in space were investigated: horizontal, sloping, and perpendicular to the trajectory of drops. The quantitative estimates obtained can be used in piedmont regions and in areas with smooth, streamlined landforms. In high mountain areas, the degree of deviation of the trajectories of the actual field from rectilinear and parallel precipitation trajectories must be considered. This deviation will determine the degree of representativeness of precipitation stations. Intersection of rain trajectories by planes of different slope and orientation is diagrammed, and maximum difference in amounts of precipitation received by right and left slopes of a valley is tabulated. (Josefson-USGS)
W74-05843

2C. Snow, Ice, and Frost

NITROGEN FIXATION IN A SUBARCTIC MIRE,
Kungliga Lantbrushogskolan, Uppsala (Sweden).
For primary bibliographic entry see Field 5B.
W74-05489

MICROWAVE RADIATION CHARACTERISTICS OF DRY AND MOIST GROUND COVERS,
A. E. Basharinov, L. F. Borodin, S. T. Egorov, and A. M. Shutko.
Available from NTIS, Springfield, Va 22151 as N73-26153 Price $3.00 printed copy; $1.45 microfiche. Typescript, 1973, 9 p, 4 fig, 4 ref. NASA Translation TT F-14975. NASA Contract NASw-2484.

Descriptors: *Remote sensing, *Microwaves, *Satellites(Artificial), Forest fires, Soil moisture, Temperature, Ice, Groundwater.
Identifiers: USSR.

Microwave measurements from space can be used to detect fires, measure soil moisture and temperature, measure sub-ice soil temperatures and the thickness of ice cover, and in the search for subsurface water. (Knapp-USGS)
W74-05558

ON A MODEL OF THE ICE BREAKUP PROCESS,
L. G. Shulyakovskiy.
Soviet Hydrology: Selected Papers, No 1, p 21-27, 1972. 2 tab, 4 ref. Translated from Transactions of Hydrometeorological Center (Trudy GMTs), No 49, p 3-10, 1972.

Descriptors: *Model studies, *Ice breakup, *Ice, *Ice cover, *Ice-water interfaces, Stress, Pressure, Friction, Velocity, Roughness(Hydraulic), Roughness coefficient, Equations.
Identifiers: *USSR.

Stresses in ice cover are produced by: (1) friction between water and the bottom surface of ice cover; (2) friction between air and the top surface of ice cover; (3) pressure of water flow on the submerged face of ice cover; (4) pressure of air flow on the ice face projecting above the water surface; and (5) wave motion. The main force producing stresses in ice cover which result in ice breakup is friction between water flow and the bottom surface of ice cover. Stresses arising in ice cover can be tensile, compressive, shearing, or bending. The predominant type of stress depends on the tortuosity of the river. Tables show the magnitude of friction forces between water and the bottom face of ice cover and between wind and the top face of ice cover, in sq m of ice surface. (Josefson-USGS)
W74-05567

METHOD FOR SUPPRESSING THE FORMATION OF ICE IN NATURAL OR MAN-MADE BODIES OF WATER,
Dow Chemical Co., Midland, Mich. (assignee).
J. S. Best.
U.S. Patent No. 3,768,264, 4 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1616, October 30, 1973.

Descriptors: *Patents, Ice, *Heat transfer, *Heat exchangers, Equipment, Iced lakes, *Navigation.
Identifiers: *Ice formation suppression.

A method for suppressing the formation of ice in natural or man-made bodies of water such as lakes, rivers, sound, straits, bays, shipping canals, shipping locks, harbors, and the like is described. The method is particularly useful in areas where ice breakers or the like cannot be efficiently operated. The method provides for direct replacement of heat lost to the atmosphere during the winter season by the use of heat transfer means such as permanent heat transfer apparatus located in and/or adjacent the sides of canals or rivers to prevent natural bridging of ice formation in them or by use of a traveling heat exchanger placed in a barge, scow, or similar vessel. The method provides for the direct replacement of heat lost to the atmosphere from a body of water during cold seasonal days when the air temperature is below that necessary for the formation of an ice cover. This replacement of heat results in maintaining the upper layer of water in the body of water just above freezing. This invention takes advantage of low level thermal energy sources by using liquid compositions to store heat near the body of water. (Sinha - OEIS)
W74-05689

WATER-LEACHABLE NUTRIENTS FROM FROZEN OR DRIED PRAIRIE VEGETATION,
South Dakota State Univ., Brookings. Dept. of Plant Science.
For primary bibliographic entry see Field 5B.
W74-05696

RATES OF QUATERNARY GLACIAL EROSION AND CORRIE FORMATION, MARIE BYRD LAND, ANTARCTICA,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
For primary bibliographic entry see Field 2J.
W74-05717

WATER RELEASE FROM THE BASE OF ACTIVE GLACIERS,
Windsor Univ. (Ontario). Dept. of Geology.
M. Stupavsky, and C. P. Gravenor.
Geological Society of America Bulletin, Vol 85, No 3, p 433-436, March 1974. 1 fig, 5 tab, 13 ref.

Descriptors: *Glaciers, Movement, *Till, Muds, Melt water, Melting, Glaciology, Slurries, Glaciohydrology, *Canada.
Identifiers: *Port Stanley Till(Can), *Magnetite.

From work done to demonstrate the plausibility of a water layer at the base of active glaciers, it is concluded that the rapid movement of some glaciers and ice sheets can only be explained by the reduction of shear stress of the ice caused by a layer or pockets of water. To test this idea, ground-up till was mixed with varying amounts of water and the alignment of the particles was measured in the Earth's magnetic field. The laboratory results were compared with those obtained from the Port Stanley Till. At the time of deposition of the Port Stanley Till, the material under the ice consisted of a slurry composed of rock and mineral particles with about 28% to 47% water by weight. The long axes of the coarse magnetite retain an alignment which was developed by ice movement either englacially or in the slurry at the ice-till interface. The fine magnetite fraction is free to rotate during deposition. The slurry at the base of the ice acts as a lubricant. This study substantiates the concept of basal sliding caused by continuous release of water from the base of active glaciers. (Knapp-USGS)
W74-05728

THE MODIFICATION OF GREAT LAKES WINTER STORMS,
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 3B.
W74-05732

RIVER-ICE PROBLEMS: A STATE-OF-THE-ART SURVEY AND ASSESSMENT OF RESEARCH NEEDS.
American Society of Civil Engineers, New York. Hydraulics Div.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10281, p 1-15, January 1974. 4 fig, 36 ref.

Descriptors: *Ice, *Ice breakup, *Ice jams, Ice loads, Rivers, *Reviews, Frazil ice, Freezing, Streams, Glaciers, Heat budget, Melting, Sedimentation, *Surveys, *Research priorities.
Identifiers: *River ice, Research needs.

The problems associated with river ice are examined, the current state-of-the-art is reviewed, and recommendations for future research are made. The highest research priorities are assigned to the topics of formation processes of river ice, ice jams, ice forces, and heat exchange processes and the effects of thermal enrichment. A number of other problems that merit attention are delineated and include ice formation on submerged surfaces, properties of ice, friction factors, sediment transport in rivers with ice, design of water intakes for ice conditions, formation of icings and riverglaciations, glacial outbursts, and ice formation at navigation locks. (Knapp-USGS)
W74-05824

ESTIMATE OF THE ACCURACY OF DETERMINATION OF SNOW COVER CHARACTERISTICS AND RECOMMENDATIONS ON THE RATIONALIZATION OF THE SNOW MEASUREMENT NETWORK,
Main Geophysical Observatory, Leningrad (USSR).
I. D. Kopanev.
Soviet Hydrology: Selected Papers, No 2, p 122-128, 1972. 6 tab, 10 ref. Translation of Transactions of the Voyeykov Main Geophysical Observatory (Trudy GGO), No 280, p 54-63, 1972.

Descriptors: *Estimating, *Snow cover, *Snow surveys, *Measurement, Depth.
Identifiers: *USSR, Snow courses, Snow density.

Errors in the determination of average snow depth and density were computed from results of experimental snow surveys performed at a selected network of stations at the time of maximum snow accumulation and at the start of snowmelt. To estimate errors, data were analyzed separately for open and sheltered areas. The absolute error in snow depth measurement is small, even in the field, and does not exceed 4 cm, except in southern zones of European Russia where snow cover is unstable and in Kazakhstan where the error exceeds 5 cm. For similar snow survey parameters, the error is much smaller in forested areas than in the open. For most zones in Siberia the absolute error is approximately of the same order of magnitude in both field and forest. Absolute and relative errors depend on the number of measurement points, the error decreasing as the number of points and length of snow course increase. Snow depth interpolation errors are greater for sheltered than for open areas. The interpolation error increases markedly in both open and sheltered areas as the time interval between snow measurements increases. The interpolation error of snow depth and, correspondingly, of the density of the snow measurement network are determined by space-time variations of snow cover. On the basis of computations, recommendations can be made with respect to selection of optimum snow survey parameters and conduct of snow observations at stations and posts of the hydrometeorological network in lowland regions of the USSR. (Josefson-USGS)
W74-05844

AIRBORNE MEASUREMENT OF SNOW-WATER EQUIVALENT USING NATURAL GAMMA RADIATION OVER SOUTHERN ONTARIO, 1972-1973,
Geological Survey of Canada, Ottawa (Ontario).
H. S. Loijens, and R. L. Grasty.
Canada Department of the Environment, Ottawa, Inland Waters Directorate Scientific Series No 34, 1973. 21 p, 13 fig, 16 tab, 25 ref, append.

Descriptors: *Remote sensing, *Snowpacks, *Snow surveys, *Water equivalent, *Canada, Nuclear moisture meters, *Gamma rays, Radioisotopes, Calibrations, Measurement.

To test airborne measurement of snow-water equivalent, four gamma-ray spectrometer surveys, each 1,850 km in length, were carried out using a sodium iodide detector assembly, flown at 150 m altitude, in an aircraft fitted with a radar altimeter and Doppler navigation system. Total radioactivity, potassium, and thorium were recorded digitally on magnetic tape and were used to calculate an average snow-water equivalent for 16 km sections along each flight line. The results were compared with the measurements from 40 snow courses and 10 experimental courses established along the flight lines. Soil moisture corrections from measurements at selected sites were found to decrease the calculated snow-water equivalent by an average of 2.6 cm for potassium and 3.3 cm for total count. Background radiation measurements were also important because of large fluctuations in atmospheric bismuth-214. An average absolute difference of 0.9 cm water equivalent was found between the potassium airborne and the ground results for the experimental courses. This indicated that the potassium channel can be used without making prior calibration flights at different altitudes to determine the air absorption coefficient. A larger variation of 2.1 cm between the total count and ground results suggests that calibration flights are necessary. (Knapp-USGS)
W74-05853

DIFFERENTIAL TOLERANCE OF SOME ARID-RANGE WHEATGRASSES TO SNOW MOLD,
Agricultural Research Service, Logan, Utah.
For primary bibliographic entry see Field 2I.
W74-05927

2D. Evaporation and Transpiration

EVAPORATION, INFILTRATION AND RAINFALL-RUNOFF PROCESSES IN URBAN WATERSHEDS,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-05405

DEVELOPMENT OF PREDICTION RELATIONSHIPS FOR WATER REQUIREMENTS WITH IRRIGATION COOLING,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 3F.
W74-05539

WATER-USE EFFICIENCY AND ITS RELATION TO CROP CANOPY AREA, STOMATAL REGULATION AND ROOT DISTRIBUTION,
Kansas Agricultural Experiment Station, Manhattan, Evapotranspiration Lab.
For primary bibliographic entry see Field 3F.
W74-05621

SOME EVIDENCE OF STOMATAL RESTRICTION OF EVAPORATION FROM WELL-WATERED PLANT CANOPIES,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
W. Shepherd.
Water Resources Research, Vol 8, No 4, p 1092-1095, August, 1972. 4 fig, 2 tab, 10 ref.

Descriptors: *Evapotranspiration, *Stomata, *Water requirements, Soil-water-plant relationships, Consumptive use, Hydrologic cycle, Soil moisture, Moisture, Water conservation, Canopy, Cover crops, *Evaporation.

Various aspects of stomatal control of evaporation and their practical significance have been considered in a recent exchange of opinions. Some considerable departures from potential evaporation rates observed under conditions of generous soil water supply are described. These departures occurred on days of high potential rates and represented reductions of up to about 20% from levels that might otherwise have been expected under the prevailing atmospheric conditions. However, the reductions represented only a few percent of the seasonal or annual evaporation. Accompanying symptoms of plant moisture stress are discussed. (Skogerboe-Colorado State)
W74-05662

WATER-YIELD RELATIONS FOR NON-FORAGE CROPS,
New South Wales Dept. of Agriculture, Leeton (Australia). Agricultural Research Station.
For primary bibliographic entry see Field 3F.
W74-05665

INFLUENCE OF HYDROGEN FLUORIDE FUMIGATION ON THE WATER ECONOMY OF SOYBEAN PLANTS,
Purdue Univ., Lafayette, Ind. Dept. of Horticulture.
For primary bibliographic entry see Field 3F.
W74-05838

THE ACTUAL EVAPOTRANSPIRATION OF FOUR FOREST STANDS IN THE EAST OF FRANCE, (IN FRENCH),
Centre National de Recherches Forestieres, Nancy (France). Station de Sylviculture et de Production.
G. Aussenac.
Ann Sci For. Vol 29, No 3, p 369-389. 1972. Illus. English summary.
Identifiers: Abies-grandis, Advection, Carpinus-betulus, Diurnal, Equations, *Evapotranspiration, Fagus-sylvatica, *Forests, *France, Moisture, Nocturnal, Picea-abies, Pinus-sylvestris, Rainfall, Soil, Transpiration, *Pine, *Spruce, *Fir, *Hardwood.

The actual evapotranspiration (ETR) of 4 forest stands, a Scotch pine (Pinus sylvestris), a spruce (Picea abies), a fir (Abies grandis) and a hardwood stand (Fagus sylvatica + Carpinus betulus) was studied in 1967-1969. These high forests had a regular structure and are located upon a marbled and lixiviated brown soil with a seasonal watersheet (at 60 cm depth). Evapotranspiration was estimated between periods at which soil moisture reaches the field capacity (start and end of the vegetation period). The basic equation of the method is: ETR = Pi - D plus or minus delta N, Pi = incident rainfall on the stand, D = lateral and vertical drainage, delta N = level fluctuations of the perched watersheet. Diurnal and nocturnal watertable fluctuations measured in piezometric pipes allowed drainage estimations. The spruce stand evapotranspirated less than the other stands. Different age, different structure and different environmental conditions (advection) caused differences in ETR among the stands. Rainfall interception must also be considered, as the net loss of water can be quite different according to the species and the stand structure. The actual evapotranspiration is higher or equal to the potential evapotranspiration calculated with the Boucher equation. Under temperate climates and soils closed stands of similar age and structure have almost the same actual evapotranspiration.--Copyright 1973, Biological Abstracts, Inc.
W74-05942

2E. Streamflow and Runoff

DETERMINATION OF DISCHARGE-FREQUENCY RELATIONSHIPS UTILIZING NON-LINEAR HYDROGRAPHS AND A MODIFIED RATIONAL FORMULA,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 2A.
W74-05406

METAMORPHOSIS OF A RIVER--A COMPARISON OF THE MISSISSIPPI RIVER BEFORE AND AFTER CUTOFFS,
Army Engineer District, Vicksburg, Miss. Potamology Section.
B. R. Winkley.
Available from the National Technical Information Service as PB-229 648, $5.50 in paper copy, $1.45 in microfiche. Mississippi State University Water Resources Research Institute Publication, 1973. 42 p, 28 fig, 10 tab, 13 ref. OWRR A-999-MISS(9b).

Descriptors: *Mississippi River, *Channel morphology, Channel improvement, Alluvial channels, Sediment transport, Sedimentation, Meanders, Braiding.

The efficiency of the Mississippi River is lower than it was in 1950 and the river is possibly even less efficient than it was as a natural unimproved river. Structures have been placed according to the availability of funds and wherever the need was the greatest. Therefore, even if a perfect plan of alignment and improvement had been designed, it could not have been executed. The geometry of the river has changed fast in response to the numerous cutoffs. The result is a poorly aligned river that has lost flood efficiency, proper sediment transport, and possibly some navigation control. The long-term response of the river is the important factor to consider. Raising levees may only help to aggravate the present trend; alignment, flow condition, and sediment transport and storage, as well as a deep navigation channel, must also be considered. (Knapp-USGS)
W74-05414

SOURCES AND MOVEMENTS OF WATER--AN INTERIM REPORT.
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 2L.
W74-05415

HOUSTONHANNEL, GALVESTON BAY, TEXAS: REPORT 1--HYDRAULIC AND SALINITY VERIFICATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W74-05531

CAESIUM-137 AS A WATER MOVEMENT TRACER IN THE ST GEORGE'S CHANNEL,
Institute of Oceanographic Sciences, Birkenhead (England).
T. R. S. Wilson.
Nature, Vol 248, No 5444, p 125-127, March 8, 1974. 1 fig, 2 tab, 8 ref.

Descriptors: *Tracers, *Currents(Water), *Ocean circulation, Ocean currents, Oceanography, Hydrography, Path of pollutants, Dissolved solids.
Identifiers: *St George's Channel, *Irish Sea.

The distribution of Cs-137 in the St George's Channel of the Irish Sea system shows that the residual (nontidal) flow is slightly lower than indirect estimates suggest. The constribution of turbulent mixing to the transport of dissolved and particulate material in these waters may also be calculated directly from cesium measurements. (Knapp-USGS)
W74-05555

TWO-DIMENSIONAL ANALYSIS OF BACKWATER AT BRIDGES,
University of South Florida, Tampa. Dept. of Structures, Materials, Fluids.
J. T. Franques.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY3, Paper 10403, p 379-392, March 1974. 7 fig, 11 ref, append.

Descriptors: *Backwater, *Mathematical models, *Open channel flow, *Finite element analysis, Flow around objects, *Bridges, Steady flow, Model studies.

A two-space-dimensional mathematical model computes steady flow distributions and water levels near contractions in natural waterways. The two-dimensional model provides a theoretical basis for such one-dimensional concepts as expansion losses by accounting for all losses by friction along properly located two-dimensional streamlines. The finite element solution algorithm locates these streamlines and integrates energy loss due to friction along them. Stagnation zones downstream from contractions can be predicted and located. A necessary condition for separation is that the velocity head at the point of separation exceeds head loss due to friction along some possible path for a free streamline. The absence of separation which is associated with scouring currents along the downstream side of bridge approach embankments can be predicted where the necessary condition is not satisfied. (Knapp-USGS)
W74-05734

URBAN FLOOD FREQUENCY CHARACTERISTICS,
Espey, Huston and Associates, Inc., Austin, Tex.
W. H. Espey, Jr., and D. E. Winslow.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY2, Paper 10352, p 279-293, February 1974. 5 fig, 9 tab, 19 ref, append.

Descriptors: *Urban hydrology, *Storm runoff, *Peak discharge, Urban runoff, Flood recurrence interval, Rainfall-runoff relationships, *Texas, Infiltration, Runoff, Urbanization, *Flood frequency, Flood forecasting.
Identifiers: *Urban watersheds.

On four urban watersheds located in Texas, urbanization has significantly increased peak discharge as much as 200%. However, data on the Waller Creek watershed (Austin, Tex.) and Wilbarger Creek watershed (near Austin, Tex.) suggest that the effects of urbanization on peak discharge decreases above a recurrence interval of 2-5 years. Data from 27 urban watersheds in Texas, combined with 33 urban watersheds located in Virginia, Maryland, Delaware, Illinois, and Mississippi, form the basis for the derivation of empirical flood frequency equations for small urban watersheds. These equations relate the flood discharge for recurrence intervals of 2.33 yr, 5 yr, 10 yr, 20 yr, and 50 yr to physiographic, urban, and climatic factors. The significant urban factors are the impervious cover and a channel urbanization factor. (Knapp-USGS)
W74-05738

FORM AND FLUVIAL PROCESSES IN ALLUVIAL STREAM CHANNELS,
Purdue Univ., Lafayette, Ind.
E. A. Keller.
Available from National Technical Information Service as PB-230 242, $10.00 in paper copy, $1.45 in microfiche. Ph.D. Thesis 1973, 124 p, 55 fig, 2 tab, 67 ref. OWRR-A-022-IND(3).

Descriptors: *Geomorphology, *Streambeds, *Meanders, *Channel morphology, *Channel beds, Stream bottoms, Rills, Alluvial channel, Channel width, Drainage density.
Identifiers: *Fluvial processes, Strahler stream order, Channel bed forms, Channel morphometry, Riffles, Pools, Bifurcation ratio.

The problem was to define quantitatively and qualitatively, for alluvial channels, selected aspects of form and fluvial processes which contribute to the development of fluvial systems. The relationship between the number of links and segments of natural drainage networks was found to be restricted to a narrow envelope. Theoretically, within this envelope a family of curves with the general form $y = 2x - (2n - 1)$ is defined, wherein y is the number of links, x is the number of segments, and n is the Strahler stream order defined for $n = 2, 3, 4, 5$. Comparison with more than 100 natural drainage networks indicated that these curves delineate threshold and boundary conditions and may be used to predict stream order. A five-stage model is proposed to explain the development of alluvial channels. The model is based upon channel morphology, channel morphometry, and qualitative conclusion based on numerous field observations. A generic classification is suggested, which permits hierarchical ranking of common bed forms in straight, sinuous, and meandering alluvial channels. Two major subdivisions: channel-forming and channel-altering bed forms are proposed.
W74-05819

SPECTRAL ANALYSIS AND ITS APPLICATION TO HYDROLOGIC TIME SERIES OF LOWER OHIO TRIBUTARIES,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 2A.
W74-05820

BUBBLY TWO-PHASE FLOW IN HYDRAULIC JUMP,
Toronto Univ. (Ontario). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 8B.
W74-05831

MODELS OF SPRING RUNOFF FORMATION AND PROBLEMS IN THEIR USE FOR FORECASTING THE FLOOD HYDROGRAPH,
Gidrometerologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2A.
W74-05842

NORFOLK HARBOR DISPOSAL STUDY: HYDROGEOLOGIC STUDY OF NANSEMOND CITY DISPOSAL AREA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 5B.
W74-05847

FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON,
Geological Survey, Tacoma, Wash.
J. E. Cummans.
Water-Resources Investigations 42-73, 1974. 9 p, 2 fig.

Descriptors: *Floods, *Washington, *Flood profiles, Flood recurrence interval, Flood data, Flood discharge, Flood stages.
Identifiers: *Nisqually River(Wash).

Flood profiles covering the reach from near the river mouth to river mile 6.4 were developed in a 2-year field study (1970-72) of the Nisqually River, Washington. The main channel of the reach will convey without overflow discharges as large as about 21,000 cfs, which have a 6-year recurrence interval. The banks in some areas will be overtopped at a flow of 25,500 cfs, which has a 13-year recurrence interval. The areas where overbank flooding will first occur and water-surface profiles of a 3.4-year and 100-year flood were determined for six flood-profile stations. The largest flood for which data are available was that of December 1933; the approximate area that would be presently inundated by such a flood is shown. Alder and La Grand Reservoirs can reduce the magnitude of lower annual flood peaks downstream to some extent. (Knapp-USGS)
W74-05849

THE ESTIMATION OF FLOOD FLOWS FROM NATURAL CATCHMENTS,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 4A.
W74-05850

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR DEEP CREEK, COLORADO RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
J. N. Lee.
Open-file report (Texas District), July 1973. 76 p, 2 fig, 3 tab.

Descriptors: *Hydrologic data, *Data collections, *Texas, *Rainfall-runoff relationships, *Stream gages, Streamflow, Reservoirs, Flood control.
Identifiers: *Colorado River basin(Tex).

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. Hydrologic investigations of these small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. This report is concerned with the watershed above the Geological Survey stream-gaging stations on Deep Creek in the Colorado River basin. Six floodwater-retarding structures have been completed in the watershed. They have a combined total capacity of 5,660 acre-feet and regulate floodflow from 19.9 square miles (45%) of the drainage area above the stream-gaging station. Instruments to collect rainfall, runoff, and storage data in the Deep Creek study area consist of a network of rain gages, staff gages on four pools, continuous water-stage recorders on the other two pools, and recording stream-gaging stations. During the 1971 water year, the weighted-mean rainfall over the Deep Creek portion of the study area was 32.71 inches and over the Dry Prong Deep Creek portion of the study area it was 24.85 inches. The rainfall over the Deep Creek portion was 18% above the long-term average rainfall of 27.74 inches at Brownwood. For the 1971 water year, three storms were selected for detailed computation at each recording site. These computations include detailed time breakdown of rainfall and discharge. Hydrographs and mass curves are drawn for illustrations. The storms selected occurred July 26, 27, and August 1, 1971. A summary of rainfall-runoff data for the storms is shown. (Knapp-USGS)
W74-05851

LONG-DISTANCE TELEMETRY OF DATA FOR FLOOD FORECASTING,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4A.
W74-05859

FLOOD HAZARD ANALYSES, SAND CREEK, CITY OF COLORADO SPRINGS, AND EL PASO COUNTY.
Soil Conservation Service, Portland, Oreg.
Prepared in cooperation with Colorado Water Conservation Board, July 1973. 18 p, 38 exhibit, 4 photo, 57 map, 1 tab.

Descriptors: *Floods, *Hazards, *Maps, *Colorado, Mapping, Surveys, Aerial photography.
Identifiers: *Colorado Springs(Colo).

Flood hazards near Sand Creek in the city of Colorado Springs, Colo., are shown by a map atlas of 57 sheets scaled about 1 inch=200 ft. Data were collected by aerial photography. Flood areas were determined by matching water surface profiles with topography. Primary purpose is to provide maps of the flood hazard areas so that local governments can develop flood plain regulations. The data can also be used in the location and design of roads, bridges, and channel modification. Interpretations of the flood hazard analyses and recommendations to minimize flood damages are included. Except during the periods of storm runoff, the streambed of Sand Creek is dry. The flood-producing storms normally occur during the summer months from May through August. Runoff from melting snow does not contribute materially to flooding on Sand Creek. (Knapp-USGS)
W74-05860

NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM, FORECAST PROCEDURES.
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 4A.
W74-05861

WATER RESOURCES DATA FOR NEW YORK, 1972: PART 2. WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.
Data Report, 1973. 262 p, 9 fig, 2 tab, 20 ref.

Descriptors: *Water quality, *New York, *Hydrologic data, Data collections, Water chemistry, Microbiology, Water temperature, Sediments, Sediment load, Sampling.

Water resources data for the 1972 water year for New York include records of data for the chemical and physical characteristics of surface, ground, and precipitation water. Chemical, microbiological, water temperature, and fluvial-sediment water-quality information is presented. Chemical quality includes concentrations of individually dissolved constituents and certain properties or characteristics such as hardness of water, specific conductance, and pH. Microbiological information includes quantitative identification of certain bacteriological indicator organisms. Many surface-water samples for analyses are collected at or near gaging stations. The discharge records at these stations are used in conjunction with the computations of the chemical constituents and sediment loads. The description of the sampling station gives location, drainage area, periods of record for the various water-quality data, extremes of the pertinent data and general remarks. (Knapp-USGS)
W74-05931

2F. Groundwater

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS: VOLUME II--RECORDS OF WELLS, 1892-1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W74-05527

THE DETECTION OF SUBSURFACE STREAM CHANNELS IN CARBONATE ROCKS BY GEOELECTRICAL METHODS,
Missouri Univ., Rolla. Dept. of Geology and Geophysics.
R. K. Frohlich, and G. P. Smith.
Available from National Technical Information Service as PB-229 847 $6.75 in paper copy, $1.45 in

microfiche. Missouri Water Resources Center, Columbia, Completion Report, February 1974. 71 p, 24 fig, 5 tab, 12 ref, append. OWRR A-065-MO(1). 14-31-0001-3825.

Descriptors: Electrical studies, *Resistivity, *Gravity studies, Geophysics, *Channels, *Subsurface investigations, Carbonate rocks, Karst hydrology, *Missouri, Depth, Gravimetric analysis, *Groundwater movement.
Identifiers: Karst terranes.

The distinction of partially dissolved rocks from compact carbonate rocks and from the alluvial overburden is a major problem in geological engineering and water resources. Geoelectrical depth soundings after Schlumberger were applied over karst terranes in three locations of the Ozarks of Missouri. The zone of dissolved carbonate rocks shows intermediate resistivities between its low values of the overburden and its extremely high value for the compact rock. The investigation helped solve the problem of a disappearing river in Logan Creek Valley, near Ellington, Missouri. Combined geoelectrical and gravity surveys under consideration of some seismic near surface refractions indicate zones of increased depth and dissolution at the Ellington Fault. A detailed gravity profile across the fault shows a negative anomaly with a minimum of -2.0 mgal, which extends over approximately 3 miles with large lateral gradients. A theoretical model can explain the anomaly for a depth of the cavernous limestone of 350 feet with a bulk volume of fissures and stream channels amounting to 15%. The coincidence between the fault and the negative anomaly suggests that ruptures along several fault planes weakened the rock so that chemical dissolution from surface waters had a greater penetration.
W74-05541

AVAILABILITY OF GROUND WATER IN THE FEDERAL WAY AREA, KING COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4B.
W74-05545

A SUMMARY ON GROUND WATER IN THE HAN RIVER BASIN, REPUBLIC OF KOREA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4B.
W74-05546

THE WATER TABLE ON LONG ISLAND, NEW YORK, IN MARCH 1970,
Geological Survey, Mineola, N. Y.
For primary bibliographic entry see Field 4B.
W74-05556

EVOLUTION OF THE ISOTOPIC COMPOSITION OF LEAD IN ANCIENT MARINE BASINS (K VOPROSU OB EVOLYUTSII IZOTOPNOGO SOSTAVA SVINTSA V DREVNIKH MORSKIKH BASSEYNAKH),
Akademiya Nauk SSSR, Leningrad. Institut Geologii i Geokhronologii Dokembriya.
E. K. Gerling, and A. D. Iskanderova.
Geokhimiya, No 1, p 116-120, January 1973. 1 fig, 2 tab, 9 ref.

Descriptors: *Geochemistry, *Isotope studies, *Lead radioisotopes, *Lead, *Sedimentary basins(Geologic), Sediments, Uranium radioisotopes, Carbonate rocks, Dolomite, Limestones, Calcite, Pyrite, Sea water, Geologic time.
Identifiers: *USSR, Marble, Thorium.

To obtain data on evolution of the isotopic composition of lead in carbonate rocks of ancient seas, analyses were made of about 60 samples of limestones, dolomite, and marble of varying geologic age and derived from different regions of the USSR (Aldan, Ukraine, Pamirs, Urals, etc.). Lead in seawater undergoes the same changes in its isotopic composition with time as lead in the earth's crust and, hence, reflects the evolution of terrestrial lead. (Josefson-USGS)
W74-05559

GROUNDWATER RESOURCES OF CENTRAL ASIA (RESURSY GRUNTOVYKH VOD TSENTRAL'NOY AZII),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
N. T. Kuznetsov.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 5, p 45-54, September-October 1973. 3 tab, 12 ref.

Descriptors: *Groundwater resources, *Groundwater availability, *Groundwater, *Surface-groundwater relationships, *Mountains, Water balance, Alluvium, Estimating.
Identifiers: *USSR(Central Asia).

Distinct differences are observed in the distribution of natural groundwater resources in individual mountain systems of Central Asia. In the Mongolian Altay, Tien Shan, Kunlun Shan, and Altyn Tagh, groundwater resources decrease from west to east. The opposite trend is observed in the Nan Shan and Hangayn-Henteyn mountains. Minimum natural groundwater resources are found in mountains of western Nan Shan, the eastern part of Altyn Tagh and on southeastern ridges of Tien Shan. Total natural groundwater resources in the mountains of Central Asia are estimated at 45.62 cu km/yr, of which more than half (26.6 cu km/yr) are concentrated in the Tien Shan and Kunlun Shan. Flooding of the northern piedmont plain of Kunlun Shan is due to the presence of thick alluvial fans of the Guma, Yurung Kash, Kara Kash, Keriya, and Niya Rivers where groundwater is abundant, comprising a large part of the natural groundwater resources of the region. Natural groundwater resources of the Tarim basin, estimated at 11.64 cu km/yr, are concentrated in thick alluvial fans of the Muz Art, Konchedar'ya, Aksu, Yarkand, Yurung Kash, Kara Kash, and several other less water-bearing rivers. Natural groundwater resources of lowlands in the Tarim basin are estimated at 8.67 cu km/yr, of which 1.09 cu km/yr is groundwater outflow from the Kashgar amphitheatre. Estimated natural groundwater resources of Tien Shan and Kunlun Shan, lowland areas of Kashgaria and Dzungaria, and of major intermontane depressions of Central Asia are tabulated. (Josefson-USGS)
W74-05562

GROUNDWATER OF PASTURES OF KAZAKHSTAN (PODZEMNYYE VODY PASTBISHCHNYKH TERRITORIY KAZAKHSTANA).
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Gidrogeologii i Gidrofiziki.
Izdatel'stvo 'Nauka' Kazakhskoy SSR, Alma-Ata, Akhmedsafin, U. M., editor, 1969. 304 p.

Descriptors: *Groundwater, *Confined water, *Groundwater resources, *Pastures, *Areal hydrogeology, Geomorphology, Stratigraphy, Rocks, Aquifers, Water table, Water levels, Water level fluctuations, Water wells, Water types, Thermal water, Connate water, Pore water, Water chemistry, Cross-sections, Mapping.
Identifiers: *USSR(Kazakhstan), Mineralization.

The area of pastures in Kazakhstan exceeds 180 million ha, which is 56% of all pastures in the USSR. Groundwater and artesian water of pastures in 15 Oblasts of the Republic and thermal water of pastures in 8 Oblasts of the Republic are described. Adaptation of different groundwater types to specific age and lithological complexes of rocks is examined, and studies are made of lithology and thickness of aquifers and of spatial distribution, depths of occurrence, mineralization, and chemical composition of groundwater and artesian water. Groundwater resources are determined for each large area of pasture, and prospects of their utilization are discussed. Recommendations are made for efficient use of groundwater and artesian water for agricultural water supply, flooding, and oasis irrigation. (Josefson-USGS)
W74-05563

A PROGRESS REPORT ON RESULTS OF TEST-DRILLING AND GROUND-WATER INVESTIGATIONS OF THE SNAKE PLAIN AQUIFER, SOUTHEASTERN IDAHO,
Geological Survey, Boise, Idaho.
E. G. Crosthwaite.
Available from Idaho Dept. of Water Admin., Statehouse-Annex 2, Boise, Idaho 83707 Price $0.50. Idaho Department of Water Administration Water Information Bulletin No 32, October 1973. 60 p, 11 fig, 1 tab, 11 ref.

Descriptors: *Hydrogeology, *Idaho, Aquifer characteristics, Stratigraphy, Basalts, Water table, Artesian aquifers, *Groundwater, Water wells, Data collections, Hydrologic data, *Aquifer testing.
Identifiers: *Snake Plain Aquifer(Idaho).

Test holes were drilled to depths of approximately 1,000 feet in the Mud Lake region of Idaho. A large part of the region is underlain by both sedimentary deposits and basalt flows. The saturated geologic section consists predominantly of beds of sediments that are intercolated with numerous basalt flows. Downgradient from the barrier, sedimentary deposits are not common and practically all the water-bearing formations are basalt. The sedimentary-basaltic sequence forms a complex hydrologic system in which water occurs under water-table conditions in the upper few tens of feet of saturated material and under artesian conditions in the deeper material in the southwest part of the region. Three wells were drilled and another well deepened in a part of the Snake River Plain where geologic and hydrologic data are sparse. Most of the material drilled was basalt with a few thin interbedded fine-grained sedimentary deposits. The sediments increase in thickness and coarseness near the mouth of the Big Lost River basin. The water-level data obtained from the wells indicate that the water-table gradient is relatively steep between Arco and American Falls and that the gradient is relatively low southwest of the area of steep gradient. The reason for the steep gradient is not clear, but the water table may be influenced by a rift zone which is visible more than three-fourths of the way across the Plain from the Craters of the Moon National Monument; by a change in thickness of the aquifer caused by a ridge representing a buried north-south treding mountain range; by a significant thickening of basalt filling an erosional basin immediately downgradient from the steepened gradient; or by a fault in the underlying basalt whose trace has been obliterated by younger flows. (Knapp-USGS)
W74-05715

LONGITUDINAL DISPERSION IN SATURATED POROUS MEDIA,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 5B.
W74-05832

GROUND WATER IN THE KANSAS RIVER VALLEY, JUNCTION CITY TO KANSAS CITY, KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W74-05848

SINKHOLE PROBLEM ALONG PROPOSED ROUTE OF INTERSTATE HIGHWAY 459, NEAR GREENWOOD, ALABAMA,
Geological Survey, University, Ala.
J. G. Newton, C. W. Copeland, and L. W. Scarbrough.
Alabama Geological Survey, University Circular 83, 1973. 63 p, 21 fig, 2 plate, 3 tab, 18 ref.

Descriptors: *Land subsidence, *Karst hydrology, *Sinks, *Alabama, Withdrawal, Mine drainage, *Water table, Hydrogeology, Water level fluctuations, *Groundwater movement, Infiltration, Highways.
Identifiers: Greenwood(Ala).

Sinkholes in and adjacent to the proposed right-of-way of Interstate Highway 459 near the community of Greenwood in Bessemer, Alabama, pose costly construction and potential maintenance and safety problems. More than 150 sinkholes, depressions, and related features have formed in or near the right-of-way. Their occurrence began about 1950 and continued through March 1972. A general lowering of the water table during the early 1950's or the preceding decade, compounded with a prolonged drought during the 1950's, makes the area prone to the development of sinkholes. Openings along faults and a fold provide hydraulic connection between aquifers at the surface and mines at depths exceeding 1,000 feet. Cessation of pumpage from wells and mines has resulted in conditions favorable to the recovery of the water table. Sinkholes occur where cavities develop in residual or alluvial deposits overlying openings in limestone. The downward migration of the deposits into openings in the underlying limestone and the formation and collapse of the cavities are caused or accelerated by a decline in the water table that results in (a) an increase in the amplitude of water-table fluctuations, (b) the increased movement of surface water through unconsolidated deposits into openings in bedrock in areas where recharge had previously been rejected, (c) an increase in the velocity of movement of groundwater, and (d) loss of support to unconsolidated deposits overlying openings in bedrock. A recovery of the water table will probably result in a cessation of or drastic decrease in sinkhole development. (Knapp-USGS)
W74-05857

2G. Water In Soils

DETECTING SALINE SOILS IN THE RED RIVER VALLEY, MINNESOTA, BY REMOTE SENSING TECHNIQUES,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05519

METHODS OF MEASURING SOIL MOISTURE,
McMaster Univ., Hamilton (Ontario).
R. G. Wilson.
International Field Year for the Great Lakes Technical Manual Series No 1, 1971. 19 p, 4 fig, 4 plate, 1 tab, 88 ref.

Descriptors: *Soil moisture meters, *Instrumentation, *Measurement, Soil water movement, Soil water, Soil moisture, Nuclear moisture meters, Moisture content.

The techniques and the potential errors and accuracies of measuring soil moisture content, suction, and movement are reviewed. There are three widely used methods of measuring soil moisture content: the gravimetric, the neutron scattering, and the gamma-ray attenuation methods. The neutron scattering method is the most accurate for routine field measurements. The complex procedures required for the use of the gamma-ray attenuation method make it more suitable for laboratory work. The determination of the average moisture content in a volume of soil is best achieved by the neutron method, whereas the gamma-ray attenuation method is best suited for determining the moisture content at a given point in a soil profile. Soil suction can be measured with tensiometers, pressure and suction apparatus, psychrometers and electrical resistance units. Pressure and suction apparatus can be used only in a laboratory, and the accuracy of the technique is questionable. The use of tensiometer-pressure transducer systems has been limited to laboratories, but they have recently been developed for field use. They possess many advantages over the tensiometer-manometer systems including greater sensitivity and the possibility of recording. The main disadvantage of the tensiometer is that it is useful only over a limited range of suction values. Psychrometers and resistance blocks overcome this disadvantage but are not very accurate. Soil moisture movement is usually calculated from the hydraulic gradient and the hydraulic conductivity. Sensors to detect moisture movement have recently been developed but are strictly experimental at present. (Knapp-USGS)
W74-05557

MICROWAVE RADIATION CHARACTERISTICS OF DRY AND MOIST GROUND COVERS,
For primary bibliographic entry see Field 2C.
W74-05558

TENSIOMETER-PRESSURE TRANSDUCER SYSTEM FOR STUDYING UNSTEADY FLOW THROUGH SOILS,
Idaho Univ., Moscow. Dept. of Agricultural Engineering.
D. W. Fitzsimmons, and N. C. Young.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 15, No 2, p 272-275, March-April, 1972. 6 fig, 10 ref.

Descriptors: *Soil moisture meters, *Tensiometers, *Soil water movement, Moisture tension, Pressure measuring instruments, Unsteady flow, Unsaturated flow, Soil water, Tension, Soil moisture, Irrigation, Measurement, *Non-destructive tests.

A new, fast-acting system has been developed to nondestructively measure moisture content of soil. The system is based on the old tensiometer technique with two important changes. A tensiometer barrier material made of polyvinyl chloride is used. This allows the water to pass to or from the soil much more quickly than previous materials. Diaphragm-type pressure transducers which have extremely small full-scale volumetric displacements provide much faster readings. These units were used to investigate moisture movement. Descriptions of technique and apparatus along with results are presented. (Skogerboe-Colorado State)
W74-05668

SUBSURFACE DISTRIBUTION OF NONUNIFORMLY APPLIED SURFACE WATERS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-05671

MEASUREMENT OF UNSATURATED HYDRAULIC CONDUCTIVITY BY THE CONSTANT OUTFLOW METHOD,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
A. R. Overman, and H. M. West.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 15, No 6, p 1110-1111, November-December, 1972. 6 fig, 4 ref.

Descriptors: *Drainage engineering, *Soil physical properties, *Soil water movement, Soil physics, Permability, Percolation, Soil moisture, Drainage, Drainage effects, Farm management, *Hydraulic conductivity, Measurement.

Unsaturated hydraulic conductivity was calculated for Lakeland fine sand using constant outflow from the bottom end of a column. Beginning at saturation, hydraulic head was measured at several positions during drawdown. Water content was found to drop from 34.6 percent at saturation to approximately 11 percent and a corresponding tension of 60 cm. Drainage appears to continue toward constant water content rather than toward the true equilibrium condition of constant hydraulic head. (Skogerboe-Colorado State)
W74-05675

WATER TABLE AND SOIL MOISTURE PROBABILITIES WITH TILE DRAINAGE,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
T. C. Young, and J. T. Ligon.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 15, No 3, p 448-451, May-June, 1972. 8 fig, 13 ref.

Descriptors: *Subsurface drainage, *Tile drainage, Model studies, Mathematical models, Computer models, Drainage, Drainage engineering, Closed conduits, *South Carolina, *Water table, *Soil moisture, Climatic data.

A method of soil mosture balance proposed by Ligon et al. (1965) was modified to include surface runoff and checked against field data. The agreement of the measured and computed data indicated that the soil moisture balance was adequate for estimating soil moisture conditions and excess moisture. The transient-flow equation development by van Schilfgaarde (1965) was verified with five months field data from a field drainage laboratory. The excess moisture estimated from the soil moisture balance was considered as the net accretion to the water table. The soil moisture balance and the transient-flow equation were combined in a computer model of the environment, soil and drainage system. An average decrease of 1.67 percent of soil moisture in the upper 30 inches of soil was found for a one-foot drop of the water table. (Skogerboe-Colorado State)
W74-05677

ESTIMATION PROCEDURES FOR RESPONSE FUNCTIONS OF CROPS TO SOIL WATER CONTENT AND SALINITY,
Hebrew Univ., Jerusalem (Israel). Dept. of Agricultural Economics.
For primary bibliographic entry see Field 3F.
W74-05678

SHAPE FACTORS IN IRRIGATION WATER ADVANCE EQUATION,
Uttar Pradesh Agricultural Univ., Naini Tal (India). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-05681

WATER-LEACHABLE NUTRIENTS FROM FROZEN OR DRIED PRAIRIE VEGETATION,
South Dakota State Univ., Brookings. Dept. of Plant Science.
For primary bibliographic entry see Field 5B.
W74-05696

SLOW MOVEMENT OF EARTH UNDER TROPICAL RAIN FOREST CONDITIONS,
Clark Univ., Worchester, Mass. Graduate School of Geography.
For primary bibliographic entry see Field 2J.
W74-05724

SITE EVALUATION ACCORDING TO SOIL MOISTURE CONTENT AND ECESSARY IMPROVEMENT PRACTICES IN THE USSR,
Main Geophysical Observatory, Leningrad (USSR).
Ye. N. Romanova.
Soviet Hydrology: Selected Papers, No 3, p 250-259, 1972. 4 fig, 1 tab, 7 ref. Translation of Transactions of the Voyeykov Main Geophysical Observatory (Trudy GGO), No 288, p 66-82, 1972.

Descriptors: *Soil moisture, *Moisture content, *Sites, *Slopes, *Soil management, Irrigation practices, Hydrologic budget, Water balance, Precipitation(Atmospheric), Evaporation, Variability, Seasonal, Mapping, Equations.
Identifiers: *USSR, Nomograms.

To estimate variations in soil moisture content as a function of site, relief features must be used to quantitatively determine uneven distribution of precipitation and its uneven loss through evaporation from slopes of different steepness and orientation. To determine moisture supply of soils at different locations by humidity zones, nomograms were constructed for loam soils on slopes with a straight and concave profile and with a convex profile. These nomograms can be used to estimate similar moisture conditions in different zones and possible soil moisture variations as a function of site in each zone. Improvement practices for a complex relief in different humidity zones are diagrammed for spring and summer, and 11 regions in the USSR are delineated on a map to show locations with optimum soil moisture conditions and areas with most unfavorable soil moisture conditions within humidity zones ranging from excessively wet to arid. (Josefson-USGS)
W74-05841

A MULTIPHASE MODEL FOR INFILTRATION (MODELE D' INFILTRATION POLYPHASIQUE),
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. J. Morel-Seytoux.
Paper presented at French-English Symposium on Unsaturated Flow in Porous Media, Reading, England, January 24-25, 1973. 10 p, 5 fig, 4 ref, OWRR B-070 Colo(2).

Descriptors: *Infiltration, Model studies, Air environment, *Subsurface flow, *Unsaturated flow.
Identifiers: *Air flow, Air compressibility, *Imbibition, *Two-phase flow.

The traditional equations of water movement in the unsaturated zone neglect air movement. Under certain circumstances it is known that the viscous resistance to air flow and the air compressibility have significant effects on the water behavior. The goal is to show in a particular case, that the more rigorous approach of the two-phase flow theory does not complicate the solution of the problem. There is therefore no reason, theoretical or practical, not to treat the problem of water movement in the unsaturated zone in the more rigorous and, importantly, more physical manner.
W74-05911

THE ROLE OF SOIL WATER IN THE HYDROLOGIC BEHAVIOR OF UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
W. L. Nutter.
In: Field Soil Water Regime, Soil Science Society of America, Madison, Wisconsin, Special Publication No. 5, Chapter 10, p 181-193, 1973, 6 fig, 19 ref. OWRR A-022-GA(2) and A-025-GA(1), 14-31-0001-3210 and 14-31-0001-3510.

Descriptors: *Soil water movement, Infiltration, Retention, *Subsurface flow, Subsurface drainage, Recession curves, Streamflow, *Base flow, Effluent streams, *Storm runoff, Regolith.
Identifiers: Dynamic storage, Basin geometry, *Upland basins, *Stormflow source areas.

The distribution of soil water in upland basins greatly affects the extent of source areas and the response patterns of both storm and between-storm streamflow. Except during the most extreme storms, all the precipitation falling on well-vegetated slopes infiltrates and while some reappears in the channel as stormflow, a major portion of the rain remains in the basin as dynamic storage. During a storm, the stormflow source area expands out from the stream channel as slopes contribute primarily unsaturated subsurface flow and the channel system lengthens. After the storm ceases, source areas may continue to expand as subsurface flow feeds the lower slopes near the channel, often leading to a second hydrograph peak several hours or days after the rain ceases. As the channel system and source areas recede, unsaturated subsurface flow continues to sustain baseflow. Basin parameters that affect the soil water regime and associated soil water energy conditions, and therefore the distribution of source areas, are slope length from channel to ridge, angle of slope, regolith depth, and regolith physical properties. Physical models of hillslope segments have provided some insight into the interrelations among the basin parameters as well as the flow pathways and source areas of subsurface flow.
W74-05913

LATERITIC DEEP WEATHERING OF GRANITE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
R. J. Gilkes, G. Scholz, and G. M. Dimmock.
Journal of Soil Science, Vol 24, No 4, p 523-536, December 1973. 5 fig, 2 tab, 24 ref.

Descriptors: *Weathering, *Granites, *Laterites, *Australia, Soil formation, Geochemistry, Soil chemistry, Mineralogy, Calcium, Sodium, Magnesium, Kaolinite, Trace elements, Iron, Aluminum.

Chemical and mineralogical analyses of two representative laterite profiles developed from granite in southwestern Australia show several depth zones defined by particular mineral suites and geochemistry. Changes in geochemistry in both profiles can be related to the stability of the major mineral species and to the common isomorphous substitutions occurring in them. Ca, Na, and Mg, which are mainly present in plagioclase feldspars and ferromagnesian minerals, are removed during the earliest stage of alteration of the parent granite. K, Mn, Zn, and residual Ca, Na, Mg, and Sr decrease as microcline and micas alter to kaolin. Al and Fe are most abundant in the surface zones which contain secondary sesquioxide minerals. (Knapp-USGS)
W74-05929

GAMMA RADIATION FOR MEASURING WATER CONTENTS IN SOIL COLUMNS WITH CHANGING BULK DENSITY,
Royal Veterinary and Agricultural Coll., Copenhagen (Denmark). Hydrotechnical Lab.
S. E. Olesen.
Journal of Soil Science, Vol 24, No 4, p 461-469, December 1973. 4 fig, 8 ref.

Descriptors: *Nuclear moisture meters, *Gamma rays, Calibrations, Equations, Bulk density, Sorption, Expansive soils, Clays, *Loam, Soil types.

Water profiles in soil columns were measured by the single-source gamma radiation method, using the normal attentuation equation, as well as linear and parabolic equations for the relation between bulk density and volumetric water content. To compensate for moderate changes in the bulk density during the experiment both initial and final bulk density and the water content were used in the water profile estimations. For a sandy loam soil, the radiation method without any corrections for bulk density changes resulted in a mean error of the volumetric water content estimation of 0.035 when the water content changed from 0.35 to 0.15. By correction for changing bulk density by means of a linear or a parabolic equation the maximum difference between real and estimated water content was 0.009 and 0.002, respectively. Applying the parabolic method, the error of a single water content measurement was 0.004. (Knapp-USGS)
W74-05930

SOIL MOISTURE UNDER FOREST, BUKIT TIMAH NATURE RESERVE, SINGAPORE,
Singapore Univ.
R. D. Hill.
Gard Bull (Singapore). Vol 26, No 1, p 85-93. 1972. Illus.
Identifiers: Forests, *Nature reserves, *Soil moisture, *Malaya(Singapore).

The results of a study of moisture of 3 forested hill-slope soils are presented and compared with the results of a similar study in Malaya. Soil moisture levels were usually higher than under other forms of vegetation. Statistical analysis indicated that change of moisture content was consistent within each soil but less consistent between soils. A series of statistical experiments suggested that except for the A soil horizon, soil moisture (as determined by drying) correlated reasonably well with number of rain days and that the introduction of the factor e (evapotranspiration) resulted only in slightly improved correlations except for the A soil horizon where the use of e gave much better correlations.--Copyright 1973, Biological Abstracts, Inc.
W74-05947

SOIL CHARACTERISTICS IN THE SHALLOW AQUATORIA, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
I. K. Palamarchuk.
Gidrobiol Zh. Vol 8, No 6, p 113-118. 1972.
Identifiers: *Aquatoria, Beckmannia-cruciformis, Butomus-umbellatus, Phragmites-communis, Shallow water, *Soils, Stratiotes-aloides, *Reviews.

A literature survey is presented of soil characteristics in shallow water aquatoria. Their composition and adaptability of some plants such as Bechmannia cruciformis (L.) Host., Phragmites communis Trin., Butomus umbellatus L., Stratiotes aloides L. are noted.--Copyright 1973, Biological Abstracts, Inc.
W74-05948

CHANGES OF SOIL HUMIDITY AND ITS CORRELATION TO PHYTOMASS PRODUCTION IN SANDY MEADOW ASSOCIATIONS,
Eotvos Lorand Univ., Budapest (Hungary). Dept. of Plant Taxonomy and Ecology.
E. Kovacs-Lang, and M. Szabo.
Ann Univ Sci Budap Rolando Eotvos Nominatae Sect Biol. 13, p 115-126. 1971. Illus.
Identifiers: Bromus-tectorum, Festuca-vaginata, Festuca-wagneri, *Phytomass production, Rye, Sandy meadows, *Soil humidity, *Danube River, *Tisza River.

In prairie associations characteristic of the sandy area between the rivers Danube and Tisza the phytomass production of overground and underground parts and its relation to precipitation and soil humidity were examined in 1 yr old (Brometum tectorum) and perennial meadows (Festucetum vaginatae danubiale and Festucetum wagneri) as well as in a rye field. In the vegetation periods of the years 1968 to 1969 soil humidity was regularly measured every mo. at 20, 40, 60, 100, 140 and 200 cm depth by means of a neutron scattering moisture meter. A predominance of un-

derground phytomass was characteristic of these natural associations. The production maximum of the 1 yr old meadow was observed in spring, followed by a gradual decay of organic substances in summer. The perennial meadows have a production maximum at the beginning of summer and another during the rainy autumn season. Soil humidity is influenced in the deeper layers by the quantity and in the upper layers by the distribution of rainfall. The prairies examined have an independent production rhythm, slightly influenced but not changed by humidity.--Copyright 1973, Biological Abstracts, Inc.
W74-05949

2H. Lakes

BACTERIAL DYNAMICS IN TWO HIGH-ARCTIC LAKES,
McGill Univ., Montreal (Quebec). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-05458

RESERVOIR STORAGE AND THE THERMAL REGIME OF RIVERS, WITH SPECIAL REFERENCE TO THE RIVER LUNE, YORKSHIRE,
Durham Univ. (England).
For primary bibliographic entry see Field 4A.
W74-05464

NITROGEN TRANSFORMATIONS IN SEDIMENTS AS AFFECTED BY CHEMICAL AMENDMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-05485

EFFECTS OF SEDIMENTATION OF THE ALGAL FLORA OF A SMALL RECREATIONAL IMPOUNDMENT,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-05486

METHANE FORMATION BY LAKE SEDIMENTS DURING IN VITRO INCUBATION,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-05487

TREND SULFACE ANALYSIS AND SEASONAL DISTRIBUTION PATTERNS OF PRIMARY NUTRIENTS AND CHLOROPHYLL IN UNSTRATIFIED GULF COAST ESTUARIES,
Texas Univ., Houston. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-05488

SPECIES INTRODUCTION IN A TROPICAL LAKE,
Washington Univ., Seattle. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-05492

EXPERIMENTAL APPROACHES TO LIMNOLOGY - AN OVERVIEW,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5A.
W74-05498

ECOLOGY OF FLOODPLAIN POOLS IN THE KASKASKIA RIVER BASIN OF ILLINOIS,
Illinois State Natural History Survey, Urbana.
R. Weldon Larimore, Edward C. Doyle, and A. R. Brigham.
Available from the National Technical Information Service as PB-229 849; $10.50 in paper copy, $1.45 in microfiche. Illinois University Water Resources Center, Urbana, Research Report No. 75, December, 1973. 136 p, 26 fig, 32 tab, 11 ref, 1 append. OWRR B-025-ILL(2). 14-31-0001-1897.

Descriptors: *Biological communities, Water chemistry, Periphyton, Plankton, Benthos, Fish management, *Illinois, Flood plains, Ecology, *Fish reproduction, Aquatic plants, *Nutrients, Invertebrates, Fish populations.
Identifiers: Plant nutrients, *Kaskackia River basin(Ill.), *Floodplain pools.

Physical and chemical conditions and biological communities in seven different types of floodplain pools in the upper basin of the Kaskaskia River were intensely studied over a period of 18 months and related to similar observations in the adjacent Kaskaskia River. The greatest influence on physico-chemical parameters, periphyton, benthos, and fish in the pools was the presence or absence of aquatic vegetation, particularly surface mats that restricted light penetration. The pools had less periphyton and more zooplankton than the river. Occasional flushing by the floodwaters reduced the accumulation of detritus and promoted biological production. Many species of fish moved into the floodplain pools to spawn and the young produced took advantage of the generally abundant zooplankton. The value of fish production from these pools depends to a considerable extent on the seasonal water regime. Floodplain pools are important to the Kaskaskia River system and should be preserved and managed to maintain their high production.
W74-05536

THE MODIFICATION OF GREAT LAKES WINTER STORMS,
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 3B.
W74-05732

SUPERIOR-MICHIGAN-HURON-ERIE-ONTARIO: IS IT TOO LATE,
For primary bibliographic entry see Field 5G.
W74-05801

DECAY OF MASS OSCILLATIONS IN RECTANGULAR BASINS,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
For primary bibliographic entry see Field 8B.
W74-05830

DISTRIBUTION AND MIXING OF INFLOW INTO STRATIFIED LAKES: A HYDRAULIC MODEL STUDY,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
S. J. Vogel.
Paper presented at the Fourth Southwestern Graduate Research Conference in Applied Mechanics, New Mexico State University, March 23-24, 1973; 6 p, 1 fig, 5 ref. OWRR A-044-OKLA(1) 14-31-0001-3836.

Descriptors: *Dispersion, Lakes, *Mixing, *Stratification, Model studies, *Hydraulic models, *Inflow.
Identifiers: Vertical scale distortion.

The facility for the observation of inflows into models of stratified lakes is described and the modeling parameters, including vertical scale distortion, are discussed. (Moretti-Oklahoma)
W74-05917

MAJOR ELEMENT GEOCHEMISTRY OF LAKE POWELL,
Dartmouth Coll., Hanover, N.H. Dept. of Earth Sciences.
R. C. Reynolds, and N. M. Johnson.
American Association for the Advancement of Science, 140th Paper presented at meeting, San Francisco, Feb. 1974. 22 p, 5 fig, 1 tab, 4 ref.

Descriptors: *Lakes, *Reservoirs, *Salinity, *Water quality, Water properties, Artificial lakes, *Arizona, Utah, Stratification, Inflow, Lake sediments, Limnology, Mixing, Thermal properties, Turnovers, Upwelling, Saline water, Saline lakes, Chlorides, Calcium, Calcium carbonate, Bicarbonates, Sulfates, Alkalinity.
Identifiers: *Lake Powell(Arizona).

Current and historical water quality data are synthesized into an overall descriptive model of the chemical regime of Lake Powell. Sulfate, calcium, sodium, magnesium, chlorine, and alkalinity are analyzed, and concentration configurations are determined. The salinity inputs from the Green, Colorado, and San Juan Rivers are analyzed as contributions of salts into the system of Lake Powell. The lake is a sulfate-bicarbonate-chloride system with an approximate salinity of 550 ppm TDS. Monomictic convective and thermal regimes are prevalent. Seasonal fluctuations in circulation are documented. Calcium carbonate was found to precipitate from the input waters, with maximum precipitation probably occurring in the lower reaches. This could account for a lowering of salinity of approximately 25 ppm. (Muller-Arizona)
W74-05923

MODELING THE REGULATION OF LAKE SUPERIOR UNDER UNCERTAINTY OF FUTURE WATER SUPPLIES,
Sun Oil Co., Dallas, Tex.
For primary bibliographic entry see Field 4A.
W74-05938

2I. Water In Plants

CYPRETTA KAWATAI, A NEW SPECIES OF FRESHWATER OSTRACODA (CRUSTACEA),
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05454

THE MANGROVE IN NEW ZEALAND,
Kansas Univ., Lawrence. Dept. of Geography.
A. W. Kuchler.
N Z Geogr. Vol 28, No 2, p 113-129. 1972. Illus.
Identifiers: *Avicennia-resinifera, *Mangrove, *New Zealand(North Island), Pastures, Species.

The mangrove vegetation in New Zealand from the far north to its southern limits in the center of North Island is described. There are relatively few strata and the floristic composition is always simple. A list is given of the main species (representing 6 communities) associated with the New Zealand mangrove (Avicennia resinifera). The seral status of the mangrove vegetation is emphasized. They can be reclaimed and converted to good pasture. They are not otherwise of economic importance in New Zealand.--Copyright 1973, Biological Abstracts, Inc.
W74-05469

APPLICATIONS OF AERIAL PHOTOGRAPHY AND ERTS DATA TO AGRICULTURAL, FOREST AND WATER RESOURCES MANAGEMENT.
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05515

FOREST DISEASE DETECTION AND CONTROL,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05516

THE OCCURRENCE AND DISTRIBUTION OF THE HYDROIDS OF THE GALVESTON BAY, TEXAS, AREA,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 2L.
W74-05529

BIOLOGICAL STUDIES ON THE FRESH-WATER SHRIMPS IN KOREA: 4. THE ECOLOGY OF MACROBRACHIUM NIPPONENSIS (DE HAAN) (IN KOREAN),
Texas A and M Univ., College Station. Dept. of Oceanography.
K. S. Chung.
Bull Kor Fish Soc. Vol 5, No 3, p 83-87. 1972, Illus. (English summary).
Identifiers: Biological studies, Ecology, Fishery, Food, *Korea, Macrobrachium-Nipponensis, *Protein(Fish), Sex ratio(Fish), *Shrimps, Spawning.

The fresh-water shrimp, M. nipponensis is one of the largest of the shrimp species and one of the most important types of protein food in fresh-water fisheries. It can be found from Cheju Island in the South to Chung-ju in river or swamp, in the North (Korea). Ecological features widely found in their natural environment were studied. Shrimps were collected from the Nak Dong River, near Pusan, Korea, once a month, from March-Dec. 1963. Larvae hatch from May-Sept., mainly in the month of July. The average sex ratio (male/female x 100) is 62.9% and goes down during the spawning season and rises from fall to spring season. The minimum size of the female with eggs is approximately 4.2 cm in body length, 3.5 g in body weight, and 1.5 cm in carapace length. Most shrimps of 5.75-7.75 cm in body length lay eggs. The dorsal spines of the rostrum are 10-16 (mode 13) in number and the ventral spines of the rostrum are 1-5 (mode 3) in number. (See also W73-13799)--Copyright 1973, Biological Abstracts, Inc.
W74-05583

EFFECT OF WATER-TABLE HEIGHT ON ROOT DEVELOPMENT OF PINUS CONTORTA ON DEEP PEAT IN SCOTLAND,
Macaulay Inst. for Soil Research, Aberdeen (Scotland).
R. Boggie.
Oikos, Vol 23, No 3, p 304-312, 1972, Illus.
Identifiers: Moisture, Morphology, *Peat, Pinus-contorta, *Root development, *Scotland, *Water table, *Pine trees.

Pinus contorta Dougl. was grown on deep peat in plots in which the water tables were maintained artificially at 5 levels 0-34 cm below the ground surface. Root growth was severely restricted under conditions of waterlogging, but a progressive improvement was seen as the level of the water table was lowered. Root morphology varied according to water treatment but in all profiles, root development was largely confined to the upper, aerobic horizons of the profiles as defined by absence of sulfide staining on Ag rods and redox potential measurements. There was a higher air/moisture volume ratio in the upper horizons of the peat in those parts of the plots planted with trees than in those under the natural vegetation.--Copyright 1973, Biological Abstracts, Inc.
W74-05617

A SURVEY OF STOMATAL MOVEMENTS AND ASSOCIATED POTASSIUM FLUXES IN THE PLANT KINGDOM,
Southern Piedmont Conservation Research Center, Watkinsville, Ga.
C. M. Willmer, and J. E. Pallas, Jr.
Can J Bot. Vol 51, No 1, p 37-42. 1973. Illus.
Identifiers: Arachis-Hypogaea, Commelina-Communis, Glycine-Max, Kalanchoe-Pinnata, *Potassium, *Stomatal movement, Surveys, *Epidemal tissue(Plants).

Histochemical tests for K+ were carried out on the epidermis of aerial organs from plants which varied in evolutionary development (e.g., club-mosses, ferns, angiosperms) and general morphology (e.g., monocotyledons, succulent dicotyledons, woody dicotyledons). These tests made on epidermal tissue with open or closed stomata suggested that K+ transport is implicated in stomatal movements regardless of the evolutionary level and the stomatal location in the plants investigated. In all species that displayed substantial stomatal opening, K+ was detectable in the guard cells. With small stomatal apertures, K+ was located in guard and subsidiary cells of Commelina communis L. leaves and Glycine max L. cotyledons. When stomata were closed, K+ was detectable in the subsidiary cells of the grass species, Kalanchoe pinnata Pers., C. communis, and, occasionally, in the epidermal cells surrounding the stomata of some ferns. A condition was also observed when virtually no K+ was detectable in the guard or subsidiary cells of C. communis leaves or G. max cotyledons. Commonly, when stomata were closed, K+ was not detectable in any cells of the epidermis. Exceptions were the 'K+ storage cells,' trichomes and epidermal cells of Arachis hypogaea L., and in the more primitive plants. --Copyright 1973, Biological Abstracts, Inc.
W74-05769

PERMEATION OF UNCHARGED ORGANIC MOLECULES AND WATER THROUGH TOMATO ROOTS,
Department of Agriculture, South Perth (Australia).
For primary bibliographic entry see Field 3F.
W74-05852

FOOD OF LARVAL SEA LAMPREY (PETROMYZON MARINUS) AND AMERICAN BROOK LAMPREY (LAMPETRA LAMOTTEI),
Guelph Univ. (Ontario). Dept. of Zoology.
J. W. Moore, and F. W. H. Beamish.
J Fish Res Board Can. Vol 30, No 1, p 7-15. 1973, Illus.
Identifiers: Achnanthes, *Algae, Amphora, Cyclotella, *Diatoms, Lampetra-Lamottei, Larval stages, Petromyzon-Marinus, *Sea lamprey, *Brook lamprey, *Anadromous fish, Fish diets.

Throughout the year, algae were the most frequently encountered organisms in the gut of larvae of landlocked and anadromous P. marinus and American L. lamottei. Relative abundance of organisms in the gut of both species was similar and did not change with length of larvae. In general, relative abundance of organisms in the gut was similar to that in samples of sediment and water. Occasionally, filamentous and episammic forms were not ingested because of their larger size. The number of algal cells ingested per unit of weight of sea lamprey decreased inversely with size of larvae. In the summer the number of algal cells in the gut was about thrice that found in the winter for larvae of comparable size. Survival among diatoms evacuated from the digestive tract varied from 45% in July (17.8 C) to 90% in Jan. (0 C). Representatives of the Achnanthes had the lowest survival rate (10-20%), while those of Amphora and Cyclotella had the highest (65-100%). Complete evacuation required approximately 54 and 70 hr at 16.0 and 2.5 C, respectively. Evacuation rate did not differ among the organisms consumed. The numbers of algae consumed by larval sea lamprey in a stream relative to their estimated abundance was considered negligible.--Copyright 1973, Biological Abstracts, Inc.
W74-05915

TECHNOLOGICAL MODIFICATION OF THE SEEDLING METHOD AND ANALYSIS OF ITS USEFULNESS FOR EVALUATION OF SALT TOLERANCE IN PLANTS,
For primary bibliographic entry see Field 3C.
W74-05920

DIFFERENTIAL TOLERANCE OF SOME ARID-RANGE WHEATGRASSES TO SNOW MOLD,
Agricultural Research Service, Logan, Utah.
A. T. Bleak, and W. Keller.
Journal of Range Management, Vol 26, No 6, p 434-435. November 1973. 2 tab, 7 ref.

Descriptors: Resistance, *Fungi, *Wheatgrasses, *Molds, *Range grasses, Snow, Snow cores, Snowmelt, Mortality, *Utah.
Identifiers: *Snow mold, Replicated plot.

Tolerance of four wheatgrass species to snow mold caused primarily by the typhus fungi was determined. A replicated plot containing 30 accessions of wheatgrass was used. On the basis of the percent of 1 year old plants killed, fairway wheatgrass was the most susceptible, followed by crested wheatgrass, Siberian wheatgrass, and intermediate wheatgrass which exhibited no mortality and only moderate injury. This study was a result of an infestation of snow mold in the spring of 1971 on an experimental plot near Logan, Utah. (Mastic-Arizona)
W74-05927

ECOLOGICAL AND PHYSIOLOGICAL PRINCIPLES OF PROTECTIVE AFFORESTATION IN SEMIDESERTS, (IN RUSSIAN),
For primary bibliographic entry see Field 4A.
W74-05945

LARCH PLANTATIONS IN THE FOREST STEPPE ZONE, (IN RUSSIAN),
For primary bibliographic entry see Field 4A.
W74-05946

CHANGES OF SOIL HUMIDITY AND ITS CORRELATION TO PHYTOMASS PRODUCTION IN SANDY MEADOW ASSOCIATIONS,
Eotvos Lorand Univ., Budapest (Hungary). Dept. of Plant Taxonomy and Ecology.
For primary bibliographic entry see Field 2G.
W74-05949

2J. Erosion and Sedimentation

METAMORPHOSIS OF A RIVER--A COMPARISON OF THE MISSISSIPPI RIVER BEFORE AND AFTER CUTOFFS,
Army Engineer District, Vicksburg, Miss. Potamology Section.
For primary bibliographic entry see Field 2E.
W74-05414

CELLULAR-BLOCK-LINED GRADE CONTROL STRUCTURE,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8B.
W74-05523

HYDROMORPHOLOGY OF ALLUVIAL CHANNELS OF LOWLAND RIVERS AND TIDAL ESTUARIES,
Nanking Hydrotechnical Scientific Research Inst. (Chinese People's Republic).
K-J. Tou.

Available from NTIS, Springfield, Va 22151 AD-767 029 Price $3.00 printed copy; $1.45 microfiche. Naval Oceanographic Office Translation Report No 535, 1973. 23 p, 4 fig, 2 tab, 22 ref. (Translated from Scientia Sinica, Vol 14, No 8, p 1212-1227, 1965.)

Descriptors: *Alluvial channels, *Channel morphology, Discharge(Water), Particle size, Sediment transport, Bank stability, Stream erosion, Estuaries.
Identifiers: *China.

Theoretical studies of the morphology of the channels of streams and tidal estuaries are verified by measurements of water flow rates, channel width and depth, sediment size and transport (bedload and in suspension), and the mobility and stability of stream banks and bed in the principal streams of China and some in the USSR. Equations are derived relating these parameters to each other and to the cross-sectional and longitudinal profiles of channels. Channels of streams and tidal estuaries are compared. The effects of cyclical fluctuations in flood and tidal flows are discussed. An equation for the index of channel mobility describes the shape of both rivers and tidal estuaries. (Knapp-USGS)
W74-05547

DISCHARGE PATTERNS IN TWO CREVASSES OF THE MISSISSIPPI RIVER DELTA,
Wisconsin State Univ., Oshkosh. Dept. of Geography.
For primary bibliographic entry see Field 2L.
W74-05548

DROWNED AND BURIED VALLEYS ON THE SOUTHERN NEW ENGLAND CONTINENTAL SHELF,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
R. L. McMaster, and A. Ashraf.
Marine Geology, Vol 15, No 4, p 249-268, November 1973. 8 fig, 1 tab, 27 ref. ONR N00014-68-A-0215-003.

Descriptors: *Submarine canyons, *Valleys, *Atlantic Coastal Plain, Bathymetry, Sounding, Geomorphology, Pleistocene epoch, *Continental shelf, Marine geology, *New England.
Identifiers: Drowned valleys, New England continental shelf.

Seven post-Jurassic drowned or buried drainage systems were found on the southern New England shelf. The basement and younger stream patterns have a dominant southward trend. Fluvial action under stable tectonic conditions is suggested by low valley height/width ratios. Fluvial processes responding to sea-level withdrawals have greatly influenced the shelf's later development. Periodically during post-Paleocene time, sediment from subaerial erosion has been transported to the shelf edge by streams. Deltaic deposition on a subsiding base has controlled outbuilding on the outer shelf. The frequent presence of overlying drainage networks is the result of numerous sea-level regressions. Since Eocene time, sediment has been channelled to the deep sea via Block Canyon and its progenitor. Locally structures created by erosion and glacial deposition have governed drainage direction. On the inner shelf, late Tertiary - early Pleistocene streams were diverted southeastward and southwestward by Long Island's Coastal Plain escarpment and by secondary cuestas between eastern Long Island and Block Island. (Knapp-USGS)
W74-05549

RIDGE AND SWALE TOPOGRAPHY OF THE MIDDLE ATLANTIC BIGHT, NORTH AMERICA: SECULAR RESPONSE TO THE HOLOCENE HYDRAULIC REGIME,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
D. J. P. Swift, D. B. Duane, and T. F. McKinney.
Marine Geology, Vol 15, No 4, p 227-247, November 1973. 15 fig, 34 ref. USACE Contract DACW79-69-C-0016; NSF Grants GA-1381 and GA-27305.

Descriptors: *Sedimentary structures, *Bottom sediments, *Continental shelf, Sand waves, Topography, Sand bars, Sands, Currents(Water), Storms, Ocean currents, Atlantic Coastal Plain, Barriers, Barrier islands, Marine geology, Erosion, Sedimentation.
Identifiers: Middle Atlantic Bight.

The ridge and swale topography of the Middle Atlantic Bight consists of longitudinal bed forms. This topography is the response to a regime of intermittent, south-trending storm currents. Ridges may be initiated on the shore face and detached as the coast retreats to form fields of isolated ridges, or they may be molded into the shelf-transverse sand massifs that mark the retreat paths of littoral-drift depositional centers at estuary mouths and off cuspate forelands. The ridge and swale topography is thus a stable end configuration toward which a variety of nearshore constructional topographies have converged during the Holocene transgression. Morphologic evidence for readjustment of ridge topography to the deepening shelf flow field during the Holocene transgression is discernible. (Knapp-USGS)
W74-05550

AN ADDITIONAL LOCATION OF METALLIFEROUS SEDIMENTS IN THE RED SEA,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
R. D. Bignell, J. S. Tooms, D. S. Cronan, and A. Horowitz.
Nature, Vol 248, No 5444, p 127-128, March 8, 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Brines, *Sea water, *Trace elements, Heavy metals, Hydrothermal studies, Hot springs, Bottom sediments, Manganese, Mercury, Oceanography.
Identifiers: *Red Sea.

Nereus Deep, in the Red Sea, has brines and metalliferous sediments of distinctive composition. Nereus Deep is situated within the NW-SE trending median valley of the Red Sea, is 40 km long by 12 km wide, and is divided along its length by a saddle into two parallel basins. Each basin contains a number of distinct depressions which either contain brine pools or show evidence of having contained them in the past. An appreciable thickness of iron and manganese-rich sediment contains various minor elements. Sulphide layers rich in zinc, copper, and lead may occur at greater depths. Large concentrations of mercury in the deep support this view and may indicate hydrothermal enrichments of less volatile elements below. (Knapp-USGS)
W74-05554

TRANSPORT OF SOIL PARTICLES BY SHALLOW FLOW,
Agricultural Research Service, Lafayette, Ind.
G. R. Foster, and L. D. Meyer.
Transactions of ASAE (American Society of Agricultural Engineers), Vol 15, No 1, p 99-102, January-February, 1972. 3 fig, 2 tab, 15 ref.

Descriptors: *Erosion, *Soil erosion, *Rill erosion, *Sheet erosion, Sedimentation, Erosion rates, Sediment yield, Sediment load, *Sediment transport, Soil conservation.

The Yalin equation was selected to describe the sediment transport capacity of overland flow for use in mathematical soil erosion models. Hydraulic variables in the equation are simply the hydraulic radius and slope steepness. Soil parameters needed are particle diameter, specific gravity, and the critical tractive force from Shields' diagram. When modified to consider mixtures of particle sizes, the equation predicted both the total transport rate and also the particle size distribution of the transported material. When rilling developed, transport rate predictions were within a factor of 2 relative to actual transport rates from a bed of glass spheres. Also, the predicted particle size distributions often agreed well with observed distributions. When applied to a field erosion plot where the sediment load was at transport capacity, the equation predicted sediment load within a factor of 2. (Skogerboe-Colorado State)
W74-05669

COMPUTER ANALYSIS OF OBLIQUE ACOUSTIC REFLECTION FOR OCEAN SEDIMENT IDENTIFICATION,
New Hampshire Univ., Durham. Dept. of Electrical Engineering.
A. K. Newman.
Available from NTIS as COM 73-11907, $2.75 paper copy, $1.45 microfiche. Sea Grant Publication Report No. UNH-SG-110, July 1973. 10 p, 6 fig, 7 ref. NOAA DC 1-36114.

Descriptors: *Acoustics, *Remote sensing, *Sediments, *Numerical analysis, Computer, Sediment-water interfaces, Particle size.
Identifiers: Greens' function.

IBM 360-50 digital computer subroutines were prepared in Fortran IV (G-level) to compute the value of the integral as various parameters were varied, to obtain the information and insight needed for the optimum system design for remote acoustic sensing of the ocean sediments. The preliminary investigations of the many possibilities made available by this approach are reviewed. For example, at 5000 Hz, the ratio of the 0 deg (normal incidence) acoustic reflections from coarse sand over those from fine sand is 1.085:1. At a geometric equivalent angle of incidence of 60 deg this ratio is improved to 1.328:1. Further improvements are possible if the system is designed to allow multi-frequency and multi-angle operation using advanced signal processing. Unforeseen capabilities have surfaced from computer-experiments designed to test the limits of such improvements. Two different sediments having identical acoustic impedances (acoustic impedance = Density x Compressional Wave Velocity), with one sediment having 1.1 greater wave velocity and 1/1.1 less density, have identical acoustical return energy at 0 deg or normal incidence, and were computed to have acoustic returns in a nearly 2:1 ratio at a geometric equivalent angle of incidence of 60 deg at 5000 Hz. Further computer analysis is presented showing increased improvement in remote differential sediment identification via improved system design. (Sinha - OEIS)
W74-05697

THE STRUCTURE OF MANAGEMENT AND PLANNING FOR THE COASTAL ZONE,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W74-05702

LITTORAL DRIFT COMPUTATIONS ALONG THE COAST OF FLORIDA BY MEANS OF SHIP WAVE OBSERVATIONS,
Florida Univ., Gainesville. Coll. of Engineering.
T. L. Walton, Jr.
Available from NTIS as COM 73-11896 PC$5.25 microfiche $1.45. Coastal and Oceanographic Engineering Laboratory Technical Report No. 15, Sea Grant Publication, February 1973. 97 p, 165 fig, 7 tab, 3 append. NOAA SG NG-3-72.

Descriptors: Florida, *Littoral drift, *Refraction(Water waves), *Friction, Topography, Coasts.
Identifiers: Shoaling, Ship wave observations.

A large data source of ship wave observations is used for the computation of littoral drift along segments of Florida's coast. Wave transformation from the observation site to a section of shore includes effects of shoaling, refraction, friction, and percolation. Assumptions are made that limit the analysis to an ideal beach with no anomalies in offshore topography. The results are presented in a series of littoral drift roses which make it possible to find annual rates of littoral drift for sections of Florida having sandy shorelines. A comparison of computed values of drift with existing estimated values is made for specific locations. Results of the comparison confirm most of the estimated drift directions, however the drift magnitudes differ significantly. (Sinha-OEIS)
W74-05710

RATES OF QUATERNARY GLACIAL EROSION AND CORRIE FORMATION, MARIE BYRD LAND, ANTARCTICA,
Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
J. T. Andrews, and W. E. LeMasurier.
Geology, Vol 1, No 2, p 75-80, October 1973. 6 fig, 2 tab, 25 ref. NSF Grants GA-4563 and GA-21488.

Descriptors: *Erosion rates, *Erosion, *Glaciers, *Antarctic, *Cirques, Melt water, Geomorphology, Frost action, Freezing, Thawing, Ice, Volcanoes.
Identifiers: *Marie Byrd Land(Antarctica).

Three volcanoes composed of palagonite breccia in Marie Byrd Land, Antarctica have been extensively modified by glacial erosion and have numerous large cirques. Two of the volcanoes are radiometrically dated, which enables estimates to be made of the rate of erosion. Rates of denudation of 360 to 460 mm per 1,000 yr were obtained, but differences in corrie size indicate that local headward erosion is about 5,800 mm per 1,000 yr and lateral erosion is about 800 mm per 1,000 yr. The rate apply to relatively incompetent rock. Subaerial flows of comparable age in the same region are not as intensively eroded. Erosion is probably caused by mechanical riving induced by the freezing of meltwater, which is in turn produced by local radiation conditions in the corries. Thus, glacial erosion seems to depend upon the existence of bedrock exposed above the ice sheet and the production of meltwater. (Knapp-USGS)
W74-05717

COMPOSITIONAL SORTING OF TOPOGRAPHICALLY HIGH TENNESSEE RIVER GRAVELS: A GLACIAL HYPOTHESIS,
Mississippi State Univ., State College. Dept. of Geology and Geography.
J. M. Kaye.
*Glaciation, *Tennessee River, *Glacial sediments, *Mississippi, Pleistocene epoch, Gravels, Sediment sorting, Provenance, Sediment transport.

Compositional sorting of topographically high river terrace gravels along the southwestern portion of the Tennessee River valley may be explained by alternate blanketing and uncovering of the source of metaquartzite by glacial ice in the Blue Ridge province of the southern Appalachians. Glacial meltwater may have caused the Tennessee River to spill over into the Black Belt of Mississippi where metaquartzite cobbles are found associated with a Rancholabrean vertebrate fauna. Heavy minerals associated with the metaquartzite cobbles are similar on both sides of the present Tennessee Valley Divide, adding support for a glacially controlled temporary spillover of the Tennessee River. (Knapp-USGS)
W74-05718

PROPOSAL FOR A PARTICLE-SIZE GRADE SCALE BASED ON 10,
Wisconsin Univ., Kenosha. Dept. of Geology.
J. H. Shea.
Geology, Vol 1, No 1, p 3-8, September 1973. 2 fig, 1 tab, 50 ref.

Descriptors: *Particle size, *Classification, Sampling, *Sedimentology, Sedimentation.
Identifiers: Particle-size scales.

Because the United States will eventually adopt the metric system, geologists should consider abandoning the nondecimal Udden-Wentworth-Krumbein (UWK) grade scale of particle sizes. Most of the advantages claimed for the UWK system also apply to other geometric grade scales that have an associated log-transform scale. A new grade scale is proposed. An associated log-transform scale (the tau scale) is defined so that tau=12 log 10 d/do, where do is grain diameter in millimeters and do is 1 mm. The proposed scale has easily remembered grade limits and easily calculated log-transform scale, repeating numbers, major classes of equal interval, and good potential for international adoption and application in other fields. (Knapp-USGS)
W74-05719

LATE QUATERNARY SEDIMENTATION IN THE ACTIVE EASTERN ALEUTIAN TRENCH,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Geology.
D. J. W. Piper, R. von Huene, and J. R. Duncan.
Geology, Vol 1, No 1, p 19-22, September 1973. 7 fig, 8 ref.

Descriptors: *Sedimentation rates, *Sedimentation, *Pleistocene epoch, *Alaska, *Glaciation, Turbidity currents, Bottom sediments, Stratigraphy.
Identifiers: Aleutian trench.

Sediments originally deposited on the Alaskan Abyssal Plain have been depressed to form the eastern Aleutian Trench. Simultaneously, a wedge of horizontally bedded sediments, about 1 km thick at its axis, has been deposited in the trench. The time-transgressive facies change between this wedge of sediment and the abyssal-plain sediment sequence shows up as a discontinuity on seismic records. Sediment is being deposited up to 10 times faster in the trench than on the abyssal plain. Ninety percent of the sediment in the trench arrived there by moving down the trench wall as slumps or in turbidity currents, and has been partly redistributed by turbidity currents flowing in a channel along the trench axis; 7% has come from the Survey or Channel distribution system on the abyssal plain; and 3% is pelagic (mainly ice rafted). Sediments pass from a sandy facies near the trench wall to a silt-mud facies on the abyssal plain. Sediment fill in the Aleutian Trench is abnormally thick as a result of Pleistocene glaciation; Neogene trench-fill sediments would be less than 800 m thick. (Knapp-USGS)
W74-05720

ABRASION IN PLACE: A MECHANISM FOR ROUNDING AND SIZE REDUCTION OF COARSE SEDIMENTS IN RIVERS,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
S. A. Schumm, and M. A. Stevens.
Geology, Vol 1, No 1, p 37-40, September 1973. 2 fig, 17 ref. NSF Grant GA-38621.

Descriptors: *Bed load, *Abrasion, *Gravels, *Saltation, Sediment transport, Sedimentology, Particle size, Weathering.

Rounding and reduction in size and weight of coarse particles occur over a significantly shorter distance in a stream as compared to the distance of travel required to produce a similar result in tumbling barrel or flume. This suggests that either the known processes of wear are more effective in streams than in the laboratory or that other processes are at work. Investigations of riprap failure by hydraulic engineers provide data on the forces acting on coarse particles and particle behavior prior to downstream movement. The experiments demonstrate that lift forces acting on a submerged cobble are large and vary significantly with time. When this effect of lift is combined with drag forces, a particle vibrates in place without downstream movement. With increased velocity, the particle lifts off the streambed and saltates downstream to a new position of temporary stability. During high-velocity flow, abrasion of cobbles in place and the chipping and fracturing during saltation can be significant factors causing rounding and size reduction of coarse sediments in rivers. (Knapp-USGS)
W74-05721

THE INCOMPLETE FLOOD PLAIN,
Florida State Univ., Tallahassee. Dept. of Geology.
W. F. Tanner.
Geology, Vol 2, No 2, p 105-106, February 1974. 1 fig, 1 ref.

Descriptors: *Flood plains, *Earthquakes, *Sedimentation, Lakes, Topography, Geomorphology, Sedimentation rates.
Identifiers: *Incomplete flood plains.

Incomplete flood plains are warped in such a manner (probably by tectonic deformation) that their upper surfaces are not the two-dimensional planes that alluvial rivers ordinarily build. Incomplete flood plains are not marked by oxbow lakes and other evidence of channel migration, but rather by lakes, ponds, marshes, and swamps of various sizes and shapes. The Magdalena River valley of Colombia has an incomplete flood plain through almost 1,000 km of its length. (Knapp-USGS)
W74-05722

ANATOMY OF A SHOREFACE-CONNECTED SAND RIDGE ON THE NEW JERSEY SHELF: IMPLICATIONS FOR THE GENESIS OF THE SHELF SURFICIAL SAND SHEET,
Dames and Moore, New York.
L. Stahl, J. Koczan, and D. Swift.
Geology, Vol 2, No 3, p 117-120, March 1974. 4 fig, 1 tab, 9 ref.

Descriptors: *Beaches, *Continental shelf, *New Jersey, *Barrier islands, Geomorphology, Sedimentation, Topography.
Identifiers: *Shoreface ridges.

Falling within the site survey area for an offshore nuclear power facility, Beach Haven Ridge, New Jersey, is the most thoroughly investigated shoreface-connected ridge on the Atlantic shelf. Its stratigraphy clearly indicates that it is of Holocene age and was initiated at the foot of the shoreface, after passage of the retreating barrier, as the leading edge of the shelf surficial sand sheet. (Knapp-USGS)
W74-05723

SLOW MOVEMENT OF EARTH UNDER TROPICAL RAIN FOREST CONDITIONS,
Clark Univ., Worchester, Mass. Graduate School of Geography.
L. A. Lewis.
Geology, Vol 2, No 1, p 9-10, January 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Mass wasting, *Humid areas, *Tropical regions, Creep, Landslides, Slopes, Degradation(Slope), Erosion rates, *Puerto Rico, National forests.
Identifiers: El Yunque National Forest(P.R.).

In El Yunque National Forest, Puerto Rico, the average rates of soil movement are greater than rates in other forested areas and generally are greater than in other locales. Also, the velocity distribution indicates two zones of maximum movement. This phenomenon is not explained by normal creep behavior. For the wet tropics, theory must include the roles of throughflow and the distribution of plant roots, as well as the interaction between gravity and the individual expansion and constraction of soil particles. (Knapp-USGS)
W74-05724

MASS PROPERTY VARIABILITY OF SOME ESTUARINE SEDIMENTS,
Lafayette Coll., Easton, Pa. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W74-05725

DEVELOPMENT OF FLUTE-MARK ASSEMBLAGES: 1. EVOLUTION OF PAIRS OF DEFECTS,
Reading Univ. (England). Sedimentology Research Lab.
J. R. L. Allen.
Sedimentary Geology, Vol 10, No 3, p 157-177, November 1973. 13 fig, 3 tab, 10 ref.

Descriptors: *Sedimentary structures, *Erosion, *Bed load, Ripple marks, Turbidity currents, Density currents, Sedimentation, Sedimentology, Vortices, Mud, Scour.
Identifiers: *Flute marks.

Experiments using a bed of hardened plaster of paris dissolved by a turbulent water stream are a practical analogue of natural mud-bed erosion. Paired defects evolve into compound flute marks which at a critical age become marks indistinguishable from structures developed from single defects. The critical age increases as the relative spacing of the paired defects grows larger but decreases as their alignment approaches the mean flow direction. Growth of the compound marks follows similar laws to single flutes. A natural assemblage of flute marks may be expected during an early stage of development to show a progressive reduction in the number-density of the structures, as a consequence of the merging of marks generated from defects sufficiently closely spaced to have interacted during the time available. (Knapp-USGS)
W74-05726

CHEMICAL WEATHERING OF SERPENTINITE IN THE EASTERN PIEDMONT OF MARYLAND,
Maryland Geological Survey, Baltimore.
E. T. Cleaves, D. W. Fisher, and O. P. Bricker.
Geological Society of America Bulletin, Vol 85, No 3, p 437-444, March 1974. 6 fig, 7 tab, 27 ref.

Descriptors: *Weathering, *Maryland, *Degradation(Slope), Geomorphology, Geochemistry, Water chemistry, Clays, Mineralogy, Erosion, Residual soils, Saprolites.
Identifiers: *Serpentinite, *Schist.

Weathering processes in a small watershed underlain by serpentinite in the Piedmont of Maryland were studied by means of a mass balance technique and were compared with the processes operative in a watershed underlain by schist. The two terranes are downwasting at a rate of 2.4 m per million years, but chemical weathering much more strongly affects the serpentinite (2.2 m per million year) than the schist (1.2 m per million years). The serpentinite lacks a saprolite cover because resistate minerals are absent and alumina in the bedrock is scarce. In contrast, the schist contains both quartz and a source of alumina in the alumino-silicate minerals and, as a result, has a thick saprolite mantle. The hydrologic consequences in the serpentinite terrane compared with the schist watershed are increased flood-flow discharge, greater fluctuation in seasonal, instantaneous base-flow discharge, and pronounced seasonal fluctuations in total discharge. The serpentinite stream water averaged 205 ppm of total dissolved solids in the base flow compared to 25 ppm in the schist. Stream water from the serpentinite is of the magnesium bicarbonate type; that from the schist is sodium-calcium bicarbonate type. On the serpentinite, substantial land-surface reduction (denudation) is effected by chemical weathering; mechanical weathering is secondary. On the schist terrane, mechanical weathering is the primary agent that lowers the land surface, even though chemical weathering has reduced the rock mass by almost one-half. (Knapp-USGS)
W74-05729

FACTORS DETERMINING BED FORMS OF ALLUVIAL STREAMS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
V. A. Vanoni.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY3, Paper 10396, p 363-377, March 1974. 8 fig, 2 tab, 33 ref, append.

Descriptors: *Sedimentary structures, *Ripple marks, *Alluvial channels, Bed load, Dunes, Sediment transport, Hydraulic models, Equations, Sedimentation.

Laboratory and field data of bed forms of alluvial channels were analyzed according to similarity methods. The following variables are important in determining the bed forms of sand bed streams: flow depth, mean velocity, density, viscosity, median size of sediment, and the acceleration of gravity. The data thus analyzed are presented in six graphs of depth ratio against Froude number for each of six ranges of Reynolds number. This accounts for the effects of sediment size and water viscosity or temperature. Flume data indicate that the size distribution of the bed sediment also affects bed form. A relation is developed which predicts quite well the occurrence of ripple and dune beds. (Knapp-USGS)
W74-05735

EROSION CONTROL,
Soil Conservation Service, Stillwater, Okla.
W. L. Vaught.
In: Environmental Aspects of Geology and Engineering in Oklahoma; Proceedings of a Symposium of the Oklahoma Academy of Science, December 4, 1970, Stillwater: Annals of the Oklahoma Academy of Science, No 2, p 36-41, 1971.

Descriptors: *Erosion control, *Oklahoma, Soil erosion, Wind erosion, Urban runoff, Land use, Soil conservation.

Soil-erosion problems are of a complex nature. Large amounts of sediment, a product of soil erosion, now come from housing developments, road construction, and other nonagricultural areas. The upstream watershed program in Oklahoma is combating soil erosion on 9 million acres or 20% of the total area in Oklahoma. The 1,450 floodwater-retarding structures built under the programs have trapped 39 million tons of sediment. (Knapp-USGS)
W74-05741

LANDSLIDES AND RELATED PHENOMENA PERTAINING TO HIGHWAY CONSTRUCTION IN OKLAHOMA,
Oklahoma State Dept. of Highways. Research and Development Div.
C. J. Hayes.
In: Environmental Aspects of Geology and Engineering in Oklahoma; Proceedings of a Symposium of the Oklahoma Academy of Science, December 4, 1970, Stillwater: Annals of the Oklahoma Academy of Science, No 2, p 47-57, 1971. 5 fig, 1 tab, 4 ref.

Descriptors: *Landslides, *Soil erosion, Road construction, *Oklahoma, Geology, Geologic mapping.

Common engineering-geology problems in Oklahoma include landslides, seepage, sinkholes and cave-ins, swelling (expansive) soils, hard-rock excavation, erosion, and sedimentation. Geologic maps and similar information can be used to predict the types and severity of these problems. Field observation and experience allow an association of the problem with a particular geologic rock unit. For instance, a Geologic Province map can be used for categorizing and classifying regionally occurring problems, and Geologic Unit maps can be used when more detailed classification is necessary. Depending on the type of design control required, the types of maps derived allow engineers to make proper decisions concerning the types, locations, and severity of engineering-geology problems. (Knapp-USGS)
W74-05743

SEDIMENT TRANSPORT AT LOW SHIELDS-PARAMETER VALUES,
Norconsult A/S., Oslo (Norway).
E. Helland-Hansen, R. T. Milhous, and P. C. Klingeman.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, p 261-265, January 1974. 3 fig, 1 tab, 6 ref.

Descriptors: *Sediment transport, *Bed load, *Streamflow, Velocity, Turbulence, Discharge(Water), Shear stress, Traction, Flumes, Tractive forces.
Identifiers: *Shields parameter.

Sediment transport is possible at very low values of the Shields parameter. Some methods of estimating the bed material movement in a stream assume that below some critical shear stress the sediment transport rate is zero. Based on flume experiments, it is clear that there is some probability of sediment transport at all levels of bed shear stress. (Knapp-USGS)
W74-05835

A NEW SHEAR WAVE VELOCITY MEASUREMENT TECHNIQUE IN OCEAN BOTTOM SOIL SAMPLES,
New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
B. Celikkol, and P. M. Vogel.
Available from NTIS as COM 73-11913, $2.75 paper copy, $1.45 microfiche. Sea Grant Technical Report No. UNH-SG-112, July 1973. 12 p, 6 fig, 2 tab, 19 ref. NOAA SG DC 1-36114.

Descriptors: *Soil investigations, Instrumentation, *Soil properties.
Identifiers: Shear wave velocity, Elastic properties, *Marine soils, Visco-elastic waves, Velocimeters, *Ocean bottom soil.

An improved and convenient method is described of obtaining the shear wave velocity of the soil by using inexpensive, portable and durable equipment. The material seems to be adequate for soils that are predominantly course sand or finer material which have a water content of 0.50 to perhaps 0.20. For soils that have a water content less than 0.20 it is difficult to press the probes into the soil. Therefore, if the shear wave velocity and attenuation is needed for soil of low water content, the soil must be wetted to a higher water content, then the probes inserted, and then dried to the desired water content. For soils of water content greater than 0.50, it is difficult to evaluate the performance of the velocimeter because it is not known whether or not a shear wave propagates in soil of this type. If shear waves do propagate, the velocimeter must be judged inadequate for deter-

minations of soils of high water content because then a water boundary forms at the surface of the probes. This makes an impenetrable boundary for transverse displacements. The precision of this system is adequate. By using the secondary pulse generator with a stable pulse length and an interval counter which measures time to 0.1 mu second one can obtain the transverse wave speed to three significant figures. (Sinha-OEIS)
W74-05918

THE PHYSICAL SETTING OF THE COLORADO RIVER BASIN,
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 4A.
W74-05921

2K. Chemical Processes

THE DETERMINATION OF BARIUM BY FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY USING A MODIFIED GRAPHITE TUBE ATOMIZER,
For primary bibliographic entry see Field 5A.
W74-05444

A PRELIMINARY PROCEDURE FOR THE DETERMINATION OF CADMIUM IN BLOOD,
Department of Employment, London (England). Medical Services Div.
For primary bibliographic entry see Field 5A.
W74-05445

RING-DISK ELECTRODE STUDY OF THE ANODIC BEHAVIOR OF GOLD IN 0.2M SULFURIC ACID,
State Univ. of New York, Buffalo. Dept. of Chemistry.
S. H. Cadle, and S. Bruckenstein.
Analytical Chemistry, Vol 46, No 1, p 16-20, January 1974. 5 fig, 2 tab, 13 ref.

Descriptors: *Gold, *Anodes, *Electrochemistry, Zeta potential, *Electrodes, Chemical reactions.
Identifiers: *Ring disk electrodes, Dissolution, Sulfuric acid, Ion selective electrodes, Platinum ring electrodes, Gold disk-gold ring electrodes, Gold disk-platinum ring electrodes.

The dissolution of gold from a rotating disk electrode was studied in 0.2 M H2SO4. Gold dissolution was observed at potentials greater than plus 1.13 V vs SCE. The rate of dissolution was determined as a function of potential by collecting the gold on a platinum ring electrode. Gold dissolution was also observed during the reduction of gold oxide films. The quantity of this cathodically dissolved gold was found to be a function of the electrode rotation speed, and the amount of gold oxide reduced. The increase in cathodically produced soluble gold with increasing rotation speed was shown to obey first order heterogeneous kinetics. The oxidation state of the cathodically produced gold was found to depend on the potential at which the gold oxide was formed. If the disk electrode was oxidized at E sub D less than plus 1.45 V, Au(III) was the predominant species collected at the ring electrode. However, if the oxidizing potential was greater than plus 1.45 V, a significant quantity of Au(I) was also collected at the ring electrode. (Holoman-Battelle)
W74-05446

THE DETERMINATION OF A STABILITY CONSTANT FOR THE AQUEOUS COMPLEX ZN(OH)2 USING ANODIC STRIPPING VOLTAMMETRY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5A.
W74-05455

THE DETERMINATION OF BORON IN SOLUTION TO SUB-P.P.B. CONCENTRATIONS BY HOLLOW-CATHODE EMISSION,
Virginia Univ., Charlottesville. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-05468

THE EXTRACTION-SPECTROPHOTOMETRIC DETERMINATION OF CHROMIUM (III) WITH 4-(2-PYRIDYLAZO)-RESORCINOL,
Hokkaido Univ., Sapporo (Japan). Lab. of Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W74-05470

THE SPECTROPHOTOMETRY AND SOLVENT-EXTRACTION BEHAVIOUR OF IRON(III), VANADIUM(IV AND V) AND TITANIUM(IV) CHELATES OF 1-(O-CARBOXYPHENYL)-3-HYDROXY-3-METHYLTRIAZENE,
Jadavpur Univ., Calcutta (India). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-05471

SYNERGIC SOLVENT EXTRACTION OF DIVALENT CATIONS WITH DECAFLUOROHEPTANEDIONE AND DI-N-BUTYLSULFOXIDE,
Hewlett-Packard Co., Avondale, Pa. Avondale Div.
For primary bibliographic entry see Field 5A.
W74-05472

THE APPLICATION OF PHOTO-OXIDATION TO THE DETERMINATION OF STABLE COBALT IN SEA WATER,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England).
For primary bibliographic entry see Field 5A.
W74-05473

SURFACTANT-SELECTIVE ELECTRODES. PART I. AN IMPROVED LIQUID ION-EXCHANGER,
Unilever Ltd., Port Sunlight (England). Unilever Research Lab.
For primary bibliographic entry see Field 5A.
W74-05474

GOLD TWIN-ELECTRODES IN THIN-LAYER ELECTROCHEMISTRY,
Wichita State Univ., Kansas. Dept. of Chemistry.
J. W. MacKay, and A. S. Allen.
Analytica Chimica Acta, Vol 67, No 2, p 395-402, December 1973. 6 fig, 20 ref.

Descriptors: *Electrochemistry, *Aqueous solutions, *Chlorides, Ions, Adsorption, Sodium chloride, Electrolytes, *Electrodes, *Volumetric analysis.
Identifiers: *Ion selective electrodes, Twin electrode system, Triangular sweep voltammetry, Voltammetry, Gold electrodes, Cyclic voltammetry, Perchloric acid.

The characteristics of a gold twin-electrode system in a thin-layer cell containing 0.1 M perchloric acid, and varying amounts of sodium chloride, were investigated by triangular sweep voltammetry. The 'adsorbed oxygen' layer starts to form above 1 V, and the peak from reduction of this layer shifts from 0.88 V to 0.65 V on changing the turn-around potential from 1.02 to 2.0 V. A distinct adsorption peak appears at 0.5 V, with cathodic peaks at 0.4 V and -0.1 V. Chloride adsorption is observed at 0.6 V, with desorption at 0.4 V. The dissolution of the gold electrode to gold(III) chloride occurs at 1.1 V; but this reaction is blocked above 1.2 V by the formation of the 'adsorbed oxygen' layer. The peak from the reduction of the gold(III) chloride is located at 0.7 V and is separable from the 'adsorbed oxygen' reduction peak. The electrode surface obtained from the reduction of gold(III) chloride shows characteristics different from those obtained by the reduction of the 'adsorbed oxygen' layer. (Little-Battelle)
W74-05475

NEUTRON IRRADIATION OF MERCURY IN POLYETHYLENE CONTAINERS,
Naval Undersea Center, San Diego, Calif.
For primary bibliographic entry see Field 5A.
W74-05476

A SIMULTANEOUS DETERMINATION OF ZINC AND CADMIUM,
Gustavus Adolphus Coll., St. Peter, Minn. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-05477

SEPARATION AND ANALYSIS OF MIXTURES OF CATIONIC SURFACE-ACTIVE AGENTS BY SALTING-OUT CHROMATOGRAPHY,
Kao Soap Co., Wakayama (Japan). Industrial Research Lab.
S. Fudano, and K. Konishi.
Journal of Chromatography, Vol 87, No 1, p 117-124, December 5, 1973. 6 fig, 2 tab, 15 ref.

Descriptors: *Separation techniques, *Volumetric analysis, Salts, Anion exchange, Resins, *Surfactants, *Chromatography, Methodology.
Identifiers: *Salting-out chromatography, *Cationic surfactants, Alkyltrimethylammonium chloride, Dialkyldimethylammonium chloride, Alkylpyridinium chloride, Alkylpyridinium iodide, Alkyldimethylbenzylammonium chloride, Hyamine 1622, Amberlite, Methanol, Elution.

The separation and analysis of mixtures of cationic surface-active agents by salting-out chromatography is described and some aspects of the separation mechanism of salting-out chromatography are discussed. The following cationic surfactants were symthesized and purified by recrystallization from acetone: alkyltrimethylammonium chloride (C12, C14, C16, C18); dialkyldimethylammonium chloride (C12, C14); alkylpyridinium chloride (C12, C14, C16, C18); alkylpyridinium iodide (C12, C18); alkyldimethylbenzylammonium chloride (benzalkonium chloride, C12, C14, C16, C18); and Hyamine 1622. The chromatographic conditions finally adopted were as follows: resin, Amberlite CG-4B; column, Sephadex (25 mm I.D. and 410 mm long); eluent, aqueous 45 percent (or 55 percent) methanol-0.5 M sodium chloride solution; column temperature, 40.0C; flow-rate, 0.7 ml/min; determination, two-phase titration method with bromophenol blue as indicator. Not only could a homologous series of cationic surface-active agents be separated quantitatively, but the separation and determination of the constituents of their mixtures also became feasible. It is presumed that cationic surfactants molecules are present in an ionic state and probably pass through ted by exchange of their counter ions for anions in the eluent. The solubility of a surfactant in an eluent decreases as the chain-length of the alkyl groups in the surfactant increases. Surfactant molecules with long alkyl groups can be easily salted out and adsorbed on the resin, and they therefore have large elution volumes. For this reason, dialkyldimethylammonium salts that have large hydrophobic groups were not eluted under the conditions mentioned above. The adoption of the gradient elution method, however, may not only enable these surfactants to be eluted successfully but also extend further the applicable range. (Mortland-Battelle)
W74-05481

TRANSPORT, FATE AND GEOCHEMICAL INTERACTIONS OF MERCURY, CADMIUM AND OTHER INORGANIC POLLUTANTS IN THE COASTAL LITTORAL-SALT MARSH ENVIRONMENT OF THE SOUTHEASTERN UNITED STATES.
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5B.
W74-05501

ORGANIC AND INORGANIC GEOCHEMISTRY OF SOME COASTAL PLAIN RIVERS OF THE SOUTHEASTERN UNITED STATES,
Georgia Inst. of Tech., Atlanta. School of Geophysical Sciences.
For primary bibliographic entry see Field 5B.
W74-05503

CHEMICAL CHARACTERISTICS OF DISSOLVED ORGANIC MATTER IN RIVER WATER,
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 5B.
W74-05504

WATER FOR INDUSTRIAL DEVELOPMENT IN CALHOUN, CHICKASAW, CHOCTAW, GRENADA, MONTGOMERY, WEBSTER, AND YALOBUSHA COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 3E.
W74-05525

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS: VOLUME III--CHEMICAL ANALYSES OF WATER FROM WELLS, 1922-71,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W74-05528

DETERMINATION OF THE RATE OF TRIPOLY- AND PYRO-PHOSPHATE HYDROLYSIS IN SEDIMENTS,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W74-05542

A SUMMARY ON GROUND WATER IN THE HAN RIVER BASIN, REPUBLIC OF KOREA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4B.
W74-05546

BASE OF FRESH GROUND WATER--APPROXIMATELY 3,000 MICROMHOS--IN THE SACRAMENTO VALLEY AND SACREMENTO-SAN JOAQUIN DELTA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W74-05553

AN ADDITIONAL LOCATION OF METALLIFEROUS SEDIMENTS IN THE RED SEA,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
For primary bibliographic entry see Field 2J.
W74-05554

EVOLUTION OF THE ISOTOPIC COMPOSITION OF LEAD IN ANCIENT MARINE BASINS (K VOPROSU OB EVOLYUTSII IZOTOPNOGO SOSTAVA SVINTSA V DREVNIKH MORSKIKH BASSEYNAKH),
Akademiya Nauk SSSR, Leningrad. Institut Geologii i Geokhronologii Dokembriya.
For primary bibliographic entry see Field 2F.
W74-05559

CUASES OF GEOGRAPHICAL DISTRIBUTION OF OXYGEN-18 AND DEUTERIUM IN THERMAL WATER OF THE SAYAN-BAYKAL MOUNTAINS (PRICHINY GEOGRAFICHESKOGO RASPREDELENIYA KISLORODA-18 I DEYTERIYA V TERMAL'NYKH VODAKH SAYANO-BAYKAL'SKOY GORNOY STRANY),
Akademiya Nauk URSR, Kiev. Instytut Fizychnoi Khimii.
V. Ye. Vetshteyn, I. S. Lomonosov, G. A. Malyuk, and Ye. V. Pinneker.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 5, p 122-128, September-October 1973. 2 tab, 15 ref.

Descriptors: *Geochemistry, *Isotope studies, *Oxygen isotopes, *Deuterium, *Thermal water, Thermal springs, Precipitation(Atmospheric), Air temperature, Permafrost, Water chemistry.
Identifiers: *USSR, *Sayan Mountains, *Baykal Mountains.

The isotopic composition of oxygen and hydrogen in thermal water of the Sayan-Baykal mountain range was investigated to determine their origin and mode of occurrence. Low concentrations of oxygen-18 and deuterium in thermal water attest to the important role of solid and liquid precipitation as sources of water supply. Insignificant enrichment of thermal water in oxygen-18, as evidenced in the Tsipa Depression, is associated most likely with saturation of these waters by deep crustal components. The concentration, if any, of magmatogenic waters in thermal water is extremely small as compared with the total amount of meteoric water and does not exceed 2%. Average air temperature, total atmospheric precipitation, and average annual content of oxygen-18 in precipitation in the Lake Baykal basin in 1904-58 are tabulated. Tabulated results of determinations of the isotopic composition of oxygen-18 and deuterium in thermal and surface waters and in atmospheric precipitation show that the oxygen-18 content in water samples investigated varies between minus 13.2% and minus 19.6% and that of deuterium, between minus 92% and minus 160%. (Josefson-USGS)
W74-05560

DETERMINATION OF SULFATE USING FERRIC ION-SELECTIVE ELECTRODE,
For primary bibliographic entry see Field 5A.
W74-05693

A FACTOR ANALYSIS OF SELECTED WATER QUALITY VARIABLES IN CENTRAL NEW JERSEY DURING 1960-1969,
Rutgers-The State Univ., New Brunswick, N.J. Dept. of Geography.
For primary bibliographic entry see Field 5B.
W74-05716

CHEMICAL WEATHERING OF SERPENTINITE IN THE EASTERN PIEDMONT OF MARYLAND,
Maryland Geological Survey, Baltimore.
For primary bibliographic entry see Field 2J.
W74-05729

MEASUREMENT OF THE APPARENT DISSOCIATION CONSTANTS OF CARBONIC ACID IN SEAWATER AT ATMOSPHERIC PRESSURE,
Oregon State Univ., Corvallis. School of Oceanography.
C. Mehrbach, C. H. Culberson, J. E. Hawley, and R. M. Pytkowicz.
Limnology and Oceanography, Vol 18, No 6, p 897-907, November 1973. 7 tab, 23 ref. NSF Grants GA-17011 and GA-36075X, ONR Contract N00014-67-A-0369-0007.

Descriptors: *Sea water, *Water chemistry, *Carbon dioxide, Chemical potential, Aqueous solutions, Water temperature, Salinity.
Identifiers: *Dissociation constants, *Carbonic acid.

The apparent dissociation constants of carbonic acid in seawater were determined as functions of temperature (2-35 deg C) and salinity (1.9-4.3%) at atmospheric pressure by measurement of K'1 and the product K'1 K'2. At 3.5% salinity and 25 deg C the measured values were pK'1=6.000 and pK'2=9.115; at 3.5% and 2 deg C the measured values were pK'1=6.177 and pK'2=9.431. (Knapp-USGS)
W74-05731

NATURAL CHLORIDE POLLUTION, ARKANSAS AND RED RIVER BASINS,
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 5B.
W74-05742

LATERITIC DEEP WEATHERING OF GRANITE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
For primary bibliographic entry see Field 2G.
W74-05929

WATER RESOURCES DATA FOR NEW YORK, 1972: PART 2. WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 2E.
W74-05931

2L. Estuaries

SOURCES AND MOVEMENTS OF WATER--AN INTERIM REPORT.
Geological Survey, Washington, D.C. Water Resources Div.
Available from New England River Basins Commission, 270 Orange Street, New Haven, Conn. 06511. New England River Basins Commission Long Island Sound Regional Study, November 1973. 50 p, 19 fig, 5 tab, 5 append.

Descriptors: *Estuaries, *Sounds, *New York, *Water circulation, Water balance, Climatology, Water resources, Water sources.
Identifiers: *Long Island Sound.

Knowledge about the sources, distribution and movement of water in the Long Island Sound Region is summarized. Climatological factors such as temperature, wind and cloud cover that affect elements of the hydrologic system are also discussed. The region has an abundant supply of freshwater derived from precipitation and from inflowing streams. Of the total precipitation falling on the land each year, about half returns to the atmosphere by evapotranspiration, while the remainder ultimately discharges to streams and the Sound, either directly by overland flow or indirectly by downward percolation to the water table. Long Island is underlain by a large groundwater reservoir of generally good quality. It meets almost all the island's freshwater needs. Long Island Sound is a 1,300 square mile water body with estuarine characteristics in its western and central parts and embayment characteristics in its eastern third. Circulation is controlled principally by tidal currents modified by freshwater inflow, weather conditions and topography. Surface tidal current patterns in the central and eastern Sound are elliptical and counter-clockwise in direction. At the eastern end, surface water flows into Block Island Sound, while more dense and saline bottom waters flow into Long Island Sound. At the western end, surface water from the East River flows into the Sound and bottom waters move into the East River. (Knapp-USGS)
W74-05415

FLOCCULATION OF SUSPENDED SEDIMENT IN THE SEA,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5B.
W74-05441

SUMMER STORAGE OF ENERGY AND ITS USE FOR WINTER METABOLISM AND GONAD MATURATION IN AMERICAN PLAICE (HIPPOGLOSSOIDES PLATESSOIDES),
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology.
J. C. MacKinnon.
J Fish Res Board Can. Vol 29, No 12, p 1749-1759. 1972. Illus.
Identifiers: *American plaice, Annual, *Canada(St. Margaret's Bay-U.S.), *Energy storage, *Gonad maturation(Fish), Growth, Hippoglossoides-platessoides, Summer, Winter, *Fish metabolism.

American plaice (H. platessoides) in St. Margaret's Bay, Nova Scotia had an annual energy storage cycle in which a mature 35 cm female stored 92 kcal during the summer period and used this energy for metabolism (72 kcal) and gonad maturation (20 kcal) in winter months. An additional 21 kcal was stored in the ovary during the summer period. These energy changes occurred in a fish with a total energy content of approximately 300 kcal and an annual energy increment of 51 kcal due to growth in length. The annual energy variation in immature females and males was less than in mature females. A comparison of summer production (143 kcal, excluding gonad energy) with net annual production (51 kcal) for a 35 cm female plaice indicated that higher yields would be obtained by harvesting at the end of the summer period than by taking the same fish at the end of the overwintering period.--Copyright 1973, Biological Abstracts, Inc.
W74-05463

TRANSPORT, FATE AND GEOCHEMICAL INTERACTIONS OF MERCURY, CADMIUM AND OTHER INORGANIC POLLUTANTS IN THE COASTAL LITTORAL-SALT MARSH ENVIRONMENT OF THE SOUTHEASTERN UNITED STATES.
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5B.
W74-05501

HEAVY METAL FLUXES THROUGH SALT MARSH ESTUARIES,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5B.
W74-05502

A HYDROGRAPHIC INVESTIGATION OF WINYAH BAY, SOUTH CAROLINA AND THE ADJACENT COASTAL WATERS,
Georgia Inst. of Tech., Atlanta.
D. R. Bloomer.
Skidaway Institute of Oceanography Annual Progress Report (EPA Project No R-800372), Appendix D, p 171-235, January 1974. 32 fig, 17 ref.

Descriptors: *Currents(Water), *Estuaries, *Atlantic Coastal Plain, Water circulation, *Saline water intrusion, Tides, Winds, Path of pollutants, *South Carolina.
Identifiers: *Winyah Bay(SC).

Current measurements as well as temperature and salinity data were taken in the Winyah Bay estuary, South Carolina, and the adjacent coastal waters. The water motion in this area is controlled primarily by the dominant wind conditions and secondarily by the tide. Only during calm wind conditions (less than 10 knots) will the tidal effects alone be large enough to cause reversal of the shelf currents. There is evidence that an interaction between shelf and estuarine water motion may cause temporary interruptions in the otherwise smooth current variation following the change in the tide. The estuary may best be classified as partially mixed although these conditions may fluctuate greatly depending on position in the bay, stage in the tide, and rate of freshwater inflow. The Western Channel appears to be predominantly an ebb channel, particularly during periods of high runoff. The limit of saltwater intrusion proceeds beyond the confluence of the Peedee and Waccamaw Rivers during average runoff. Even during high runoff the wedge was never completely expelled from the estuary. (See also W74-05501) (Knapp-USGS)
W74-05505

THE OCCURRENCE AND DISTRIBUTION OF THE HYDROIDS OF THE GALVESTON BAY, TEXAS, AREA,
Texas A and M Univ., College Station. Dept. of Biology.
R. E. Defenbaugh, and S. H. Hopkins.
Available from NTIS Springfield, Va. 22151 as COM 73-11410, for $3.00 printed copy; $1.45 microfiche. Texas A and M University Sea Grant College Report TAMU-SG-73-210, June 1973. 202 p, 64 fig, 8 tab, 128 ref, 3 append. TAMU-SG-73-210.

Descriptors: *Aquatic animals, *Biological communities, Benthos, Aquatic life, Habitats, Systematics, Animal groupings, Phylogeny, Speciation, Varieties, *Texas.
Identifiers: *Hydroids, *Galveston Bay(Tex).

Examination of approximately 210 collections of hydroids from the Galveston Bay, Texas, area resulted in the identification of 29 species representing 19 genera in 10 families. Three of these species are provisionally described as new. Nine species are new records for Texas waters, one species is new for the Gulf of Mexico, and one species is new for the Atlantic coast, having been previously reported only from the North American Pacific coast. The species collected belong to one or more of three hydroid faunas: a sargassum fauna (restricted to or common on sargassum); an invertebrate epifauna; and a typical hydroid fauna (occurring on any suitable substrate. It is concluded that the hydroid fauna of the area has affinities with both the southern U.S. Atlantic coast and the Caribbean, but is closer to the Atlantic coast. (Knapp-USGS)
W74-05529

HYDROMORPHOLOGY OF ALLUVIAL CHANNELS OF LOWLAND RIVERS AND TIDAL ESTUARIES,
Nanking Hydrotechnical Scientific Research Inst. (Chinese People's Republic).
For primary bibliographic entry see Field 2J.
W74-05547

DISCHARGE PATTERNS IN TWO CREVASSES OF THE MISSISSIPPI RIVER DELTA,
Wisconsin State Univ., Oshkosh. Dept. of Geography.
D. J. Arndorfer.
Marine Geology, Vol 15, No 4, p 269-287, November 1973. 12 fig, 6 tab, 14 ref. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Mississippi River, *Deltas, *Discharge(Water), *Sedimentation, Sediment transport, Tides, Alluvial channels, Bayous, Sedimentology, Levees, Floods.
Identifiers: Crevasses(Mississippi delta), Natural levees.

Variables which control water discharge in Rattlesnake Crevasse and, to a lesser extent, Little Lake Pond Crevasse, in the Mississippi River Delta are evaluated. Multiple-regression and analysis-of-variance procedures were used to assess the spatial and temporal interaction and changes in intensity of the variables. River stage, local drainage conditions, semi-monthly tide, diurnal tide, and wind determine discharge patterns in these two delta crevasses. The discharge of Rattlesnake and Little Lake Pond crevasses complements that of the primary distributaries of the Mississippi River Delta. During flooding tide, when seaward flow is inhibited in delta distributaries, the two crevasses attain maximum discharge. Flow in Rattlesnake Crevasse reverses direction during moderate and low river stages. (Knapp-USGS)
W74-05548

FISH FAUNA IN RIVER NAGARAGAWA AND ITS CHANGE FOR THE LAST SEVERAL YEARS IN RELATION TO RIVER POLLUTION (IN JAPANESE),
Seki High School (Japan).
For primary bibliographic entry see Field 5C.
W74-05580

HUMAN ECOLOGY AND COASTAL-ZONE POLLUTION,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5G.
W74-05597

DISEASES OF THE CULTIVATED PORPHYRA AT CULTURE BEDS WITH SPECIAL REFERENCE TO THE EFFECTS OF FERTILIZER PLANT EFFLUENTS (IN KOREAN),
Pusan Fisheries Coll. (Republic of Korea).
For primary bibliographic entry see Field 5C.
W74-05618

BIOLOGICAL MANAGEMENT AND CONSERVATION: ECOLOGICAL THEORY, APPLICATION AND PLANNING,
For primary bibliographic entry see Field 6G.
W74-05622

DEVELOPMENT OF A COMPUTER PROGRAM TO SIMULATE WIND WAVE GENERATION, REFRACTION, AND SHOALING IN THE GULF OF MAINE,
New Hampshire Univ., Durham. Engineering Design and Analysis Lab.
D. E. Thrall.
Available from NTIS as COM 73-11036, $3.00 paper copy. Sea Grant Publication UNH-SG-106, EDAL Report No. 113, March 1973. 48 p, 10 fig, 29 ref, 3 append. NOAA SG 2-35244.

Descriptors: *Computer programs, *Refraction(Water waves), *Winds, Maine.
Identifiers: *Wind wave generation, *Shoaling, Gulf of Maine, Wave paths.

The modification of an existing wave refraction program to include the effect of wind and its application to the Gulf of Maine is described. The selected refraction program plots the predicted wave paths, in addition to presenting them in numerical form. This feature makes the program valuable for teaching a coastal engineering class or for demonstrating coastal processes to the public domain in site selection hearings on offshore construction. Such graphic demonstration permits a much better conceptual understanding by the general public than is possible through numerical presentation of data. Judiciously used in conjunction with other decision-making tools, the graphic computer model should greatly improve mutual understanding between the technocrats and the public on coastal questions. (Sinha - OEIS)
W74-05695

A WAVE AND CURRENT INVESTIGATION IN THE NEARSHORE ZONE,
Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
W. L. Wood, Jr.
Available from NTIS as AD-768 318, $4.75 paper copy, $1.45 microfiche. Final Report, June 1973. 149 p, 37 fig, 73 ref, 2 append. ONR N00014-68-A-0109-0002.

Descriptors: *Turbulence, *Waves(Water), *Wavelengths, *Surf, Currents(Water).
Identifiers: Nearshore, *Bottom friction, *Breakers, Prediction equation, Wave height, Surface waves.

A spatial resolution method was developed for determining wave lengths in the surf. It prevents the error introduced due to rapidly transforming waves which arises in conventional calculated wave length determinations. Subsurface photographic studies on particle velocities in breaking waves indicated both horizontally dominant and vertically dominant flow paths beneath the crests of breaking waves. Breaker height decay analysis shows that turbulence due to breaking dominates bottom friction. A prediction equation is generated which will predict the exponential decay of wave height as a function of distance shoreward from the break point. A complete wave shape classification system was developed for evaluating stability and energetics of the surf zone. It is used in conjunction with a two dimensional time projection of the free surface to evaluate nearshore surface wave behavior. (Sinha - OEIS)
W74-05699

MIXING OF SALINITY-STRATIFIED WATER BY PNEUMATIC BARRIERS. REPORT I: PRELIMINARY INVESTIGATIONS. HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
W. H. McAnally, Jr.
Available from NTIS as AD-762 132, paper copy $3.00, microfiche $1.45. Research Report H-73-4, June 1973. 23 p, 7 fig, 1 tab, 3 ref.

Descriptors: *Estuaries, *Mixing, *Salinity, Sedimentation, Bubbles, *Saline water barriers, *Stratification.
Identifiers: *Bubble screens, *Pneumatic screen.

Preliminary tests were conducted to identify the process involved in mixing salinity-stratified bodies of water by means of a pneumatic (bubble) screen. Salinity, velocity, and photographic data from these tests serve as a basis for planning experiments that will ultimately develop scaling relations for the use of pneumatic screens as mixing devices. In a two-dimensional flume with an initially two-layer, density-stratified system the flow pattern created by the operation of a pneumatic screen is a three-layer system. This flow was shown by flume tests using dye tracers on each side of the screen. A circulation cell is formed that draws water toward the pneumatic screen in the upper and lower layers, mixes the different-density waters in the immediate vicinity of the screen, and discharges the mixture as an intermediate-density wedge flowing away from the screen along the initial density interface. The results suggest that the pneumatic screen may be modeled by producing scaled currents in a hydraulic model by whatever means is convenient, thus avoiding problems of scaling the pneumatic screen apparatus. (Sinha-OEIS)
W74-05701

THE STRUCTURE OF MANAGEMENT AND PLANNING FOR THE COASTAL ZONE,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
J. M. Armstrong.
Available from NTIS as COM 73-11551, PC$3.25, microfiche $1.45. Sea Grant Publication. Paper presented at Woods Hole National Workshop on Critical Problems of the Coastal Zone, Woods Hole, Massachusetts, June 2, 1972. 25 p.

Descriptors: *Coasts, *Natural resources, Management, Planning.
Identifiers: *Coastal zone.

Coastal zone management is the process of developing an understanding of the coastal zone as a system, using this knowledge to create a dynamic plan for its best use, and implementing and enforcing that plan. Since the coastal zone is a national resource, a national coastal zone management policy responsive to the needs and values of the citizenry should be established by the federal government. Consideration should be given to making provisions for such a policy to be administered by a single federal agency with coordination responsibility for other federal agencies with coastal zone responsibilities. The proposed policy should result in the enactment of appropriate and adequate legislation. (Sinha-OEIS)
W74-05702

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART I: CIRCULATION PATTERNS IN LOS ANGELES-LONG BEACH HARBOR DROGUE STUDY ATLAS AND DATA REPORT,
University of Southern California, Los Angeles.
D. F. Soule, and M. Oguri.
Available from NTIS as Com 73-11466 PC$4.25 microfiche $1.45. Sea Grant Publication No. USC-SG-6-72, December 1972. 113 p, 3 ref, numerous charts and tables.

Descriptors: California, *Circulation, *Harbors, *Water circulation, Data collections, Maps.
Identifiers: San Pedro Bay(Calif), Drogue study atlas.

A drogue study was carried out on June 13-14, 1972. The reduced data are presented from that study. A total of 57 drogues were deployed, of which 47 were recovered. Three sightings taken for each drogue on approximately half hour intervals were used to calculate by computer program and by manual triangulation the most probable positions. Elapsed time, wind and speed measurements are also entered in the computer print-out. Data are presented for each of the 47 drogues for which adequate sightings were obtained. Each data sheet is accompanied by a computer plot of the drogue track in the harbor. Summary plots of all drogues released in the morning, in the afternoon, at the surface, at 10-ft depths or at 20-ft depths are presented. Plots are included of the net movements of one morning drogue and one afternoon drogue from each station for each depth. Net movements indicate the over-all movement of water throughout the entire period given. The area of Fish Harbor and the region east of it show a high level of incursion and little circulation. This is of particular importance since the cannery and sewer outfalls are presently located to the east of the Fish Harbor area, and recreational installations are planned as extensions of the Fish Harbor east jetty. (Sinha-OEIS)
W74-05708

EFFECTIVENESS OF SEQUENTIAL PHOTOGRAPHY FOR COASTAL OCEANOGRAPHY,
Virginia Inst. of Marine Science, Gloucester Point.
M. Nichols, G. Thompson, M. Kelly, and L. Castiglione.
Available from NTIS as AD-760 713 PC$3.00 microfiche $1.45. Final Report Prepared for NOAA Spacecraft Oceanography Project and Office of Naval Research, November 1972. 167 p, 5 tab, 65 ref, 5 append. ONR N00012-71-C-371, N00014-72-C0268.

Descriptors: Chesapeake Bay, *Photography, Plankton, Phytoplankton, Environment, *Color, *Remote sensing, Suspended solids, Sediments, Oceanography, Plankton.
Identifiers: James River Estuary, *Densitometry, Water masses, Scientific satellites, *Time sensing, Temporal changes, *Tonal patterns.

Dynamic features of coastal waters can be detected and monitored in sequential photography by: (1) pattern interpretation, (2) simple comparative analyses, (3) matching of positive-negative pairs, and (4) comparative densitometry. Procedures for densitometric analyses of temporal changes are given. Application of the procedures is demonstrated by analyses of tones representing suspended sediment and plankton in the James estuary and lower Chesapeake Bay. Field and photographic studies revealed four types of water color boundaries that form either in local convergence zones of secondary currents or where water masses of different origin meet. Color changes were partly due to sediment concentration differences and were sometimes manifest by microplankton community changes, but the relationships are complex and variable. (Sinha-OEIS)
W74-05711

THE INTERDEPENDANCE OF MARINE AND ESTUARINE ECOSYSTEMS IN SOUTH AFRICA,
Natal Univ., Durban (South Africa). Oceanographic Research Inst.
For primary bibliographic entry see Field 5B.
W74-05713

THE NET CIRCULATION IN THE WEST PASSAGE OF NARRAGANSETT BAY,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
R. H. Weisberg, and W. Sturges, III.
Available from NTIS as AD-764 646 PC$4.25 microfiche $1.45. Technical Report Ref. No. 3-73, March 1973. 96 p, 46 fig, 18 tab, 25 ref, 4 append. ONR N00014-68-A-0215-0003.

Descriptors: Rhode Island, *Estuaries, Bays, *Water circulation, *Winds, Stratification, Sea breezes.
Identifiers: Narragansett Bay(RI), Water transport.

Narragansett Bay is a weakly stratified estuary comprised of three connecting passages of varying depths. The vertical distribution of horizontal velocity was observed in the West Passage using moored current meters. The primary objective was the analysis of the net circulation, i.e., the motion exclusive of the periodic tides. The net transport of water through the West Passage was observed to be seaward or landward over the entire water column for several days duration, with typical wind induced transport fluctuations of plus or minus 500 cu m/s. Hence, a net transfer of water flowing either way in response to the wind. Wind is concluded to be the dominant mechanism driving the net circulation in the West Passage of Narragansett Bay. This is in contrast with the classical views of gravitationally convected net estuarine circulation. (Sinha-OEIS)
W74-05714

MASS PROPERTY VARIABILITY OF SOME ESTUARINE SEDIMENTS,
Lafayette Coll., Easton, Pa. Dept. of Geology.
R. W. Faas.
Sedimentary Geology, Vol 10, No 3, p 205-213, November 1973. 3 fig, 3 tab, 13 ref.

Descriptors: *Bottom sediments, *Estuaries, Shear strength, Chesapeake Bay, Moisture content, Specific gravity, Physical properties, Density, Mass, Statistics, Statistical methods, *Virginia.
Identifiers: *York River estuary(Va).

Bottom sediments from two areas of the York River Estuary of southeastern Virginia were systematically sampled to depths of 40 cm and analyzed for water content, unit weight, and shearing

strength. The samples fell into: (1) a coarse-grained group of clayey sands, silty sands, and sand-silt-clays; and (2) a fine-grained group of silty clays and clayey silts. Analysis of variance between both groups revealed distinct differences in the mass properties. Means, variances, and coefficients of variation for each parameter were determined and made possible a statistical characterization of each sediment type. The data presented may be used to predict expectable values of mass properties for similar sediments, having experienced similar depositional histories. (Knapp-USGS)
W74-05725

FLUSHING OF COASTAL EMBAYMENTS BY CHANGES IN ATMOSPHERIC CONDITIONS,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
R. A. Heath.
Limnology and Oceanography, Vol 18, No 6, p 849-862, November 1973. 8 fig, 7 tab, 10 ref.

Descriptors: *Water circulation, *Bays, *Estuaries, *Canada, Currents(Water), Winds, Meteorology, Tides, Waves(Water), Surges, Seiches, Tidal effects.
Identifiers: St. Margaret's Bay(N.S.), Halifax Harbor(N.S.), Strait of Canso(N.S.).

The circulation in several coastal embayments on the east coast of Nova Scotia, Canada, is induced by changing atmospheric conditions. In summer and fall when the bays have essentially a two-layered vertical density distribution, quasi-periodic changes in wind and atmospheric pressure associated with moving atmospheric disturbances produce a quasi-periodic flow which is out of phase between the layers. Correlation between the observed flow and atmospheric parameters together with results from a simple two-layered model indicate that the flow is probably produced by wind forcing. The observed speeds in the flow are of the same size as those in the mean circulation. The generation of the fluctuating flow does not depend on the form of the bays and, therefore, this type of flow should be produced in bays on other coasts where periodic changes in atmospheric pressure associated with wind variation are observed. (Knapp-USGS)
W74-05730

WATER EXCHANGE IN TWO-LAYER STRATIFIED WATERS,
Royal Inst. of Tech., Stockholm (Sweden). Hydraulic Lab.
H. Hyden.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY3, Paper 10402, p 345-361, March 1974. 8 fig, 1 tab, 12 ref, append.

Descriptors: *Stratified flow, *Gradually varied flow, Internal waves, *Mathematical models, *Hydraulic models, Estuaries, Numerical analysis, Mixing, *Bays.

A mathematical model of two-layer stratified flow considers one-dimensional and radial flows. The numerical solution is based on the method of characteristics. The reliability of the mathematical model was investigated with one-dimensional laboratory experiments and a hydraulic model of a real bay. Agreement between calculations and experiments was achieved but the calculations are time consuming. (Knapp-USGS)
W74-05736

A BILL TO AUTHORIZE A PROGRAM TO DEVELOP AND DEMONSTRATE LOW-COST MEANS OF PREVENTING SHORELINE EROSION.
For primary bibliographic entry see Field 6E.
W74-05747

A BILL TO BE ENTITLED AN ACT RELATING TO COASTAL ZONE MANAGEMENT.
For primary bibliographic entry see Field 6E.
W74-05761

COASTAL ISLAND TRUSTS.
For primary bibliographic entry see Field 6E.
W74-05762

COUNTY OF FREEBORN V. BRYSON (DECLARATORY JUDGMENT ACTION CONCERNING PORTIONS OF A NATURAL WILDLIFE MARSH).
For primary bibliographic entry see Field 6E.
W74-05765

THE VALUE OF THE TIDAL MARSH,
Georgia Univ., Athens. Inst. of Ecology.
J. G. Gosselink, E. P. Odum, and R. M. Pope.
Work Paper No. 3, May 1, 1973. 32 p, 6 tab.

Descriptors: *Tidal marshes, *Coastal marshes, *Aquatic environment, *Marsh management, *Land management, Wildlife management, Drainage, Watersheds, Estuary, Estuarine environment, Land development, Land reclamation, Surface waters, Swamps, Tides, Waste disposal, Sewage disposal, Pollution control, Sewage treatment, Fishlife, Fisheries, Shellfish, Nutrients, Nutrient requirement, Essential nutrients, Water quality.
Identifiers: *Coastal zone management.

Tidal marshlands depend in great part for their biological richness on fresh water nutrients. The value of the tidal marsh is dependent on the normal quality and quantity of nutrient feeding systems from inland or upland sources. For this reason land use planning and development for both agricultural and urban purposes must consider the stability and growth of the tidal marsh areas. Because of the tidal activity which faces these marshes daily it has been estimated that over 50% of the organic matter and nutrients which feed and support surrounding estuarine environments are produced in the tidal marsh. These nutrients support wildlife, plants and trees, fish and shellfish, all of which could not survive in the nursery stage without the life-substances derived from the tidal marshes. Land developers and population increases are exerting strong pressures to fill marshlands for commercial, industrial and residential use. Among the uses which most threaten the tidal marsh are careless planning; industrial, agricultural and urban sewage disposal; and chemical pollution. (Silber-Florida)
W74-05782

WHO GOVERNS LOCAL WATERS,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 6E.
W74-05784

LAFAYETTE PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commision on Coastal and Marine Resources, Baton Rouge.
September 7, 1972. 30 p.

Descriptors: *Louisiana, *Marshes, *Coasts, *Management, *Planning, State governments, Administrative agencies, Pollution, Pollution control, Environment, Environmental effects, Environmental sanitation, Wildlife habitats, Fishlife, Fisheries, Water quality, Water quality control, Land use, Land management, Land development, Drainage, Floods, Flood control, Flood prevention, Waste disposal, Sewage disposal, Channelization, Estuaries, Watersheds, Groundwater, Agriculture, Industry, *Coastal zone management.

Various agricultural, industrial, governmental and citizens' groups addressed the Coastal and Marine Resources Commission hearing on coastal zone and resource problems. Management and development of the region were keynote topics. Rivers, seaports, shipping, oil and mineral industries, wildlife, watersheds and estuaries, fisheries and canneries, recreation and scenery, drainage, flooding and conservation are all competing and must be contended with in planning the future development and management of the region. Pollution control and environmental preservation were the primary concerns of the citizens' groups, as were land development policies. Water resources development and the marine sciences were also of concern, particularly the vast food potential yet to be harvested from the sea. Consideration of the public health, welfare and livelihood was also brought to the Commission's attention. Soil and water conservation, erosion control, wildlife protection and pollution control and waste disposal were considered. (Silber-Florida)
W74-05785

LAKE CHARLES PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.
October 5, 1972. 38 p.

Descriptors: *Louisiana, *Coasts, *Marshes, *Management, *Planning, State governments, Administrative agencies, Pollution, Pollution control, Environment, Environmental effects, Environmental sanitation, Wildlife, Wildlife habitats, Fishlife, Fisheries, Water quality, Water quality control, Land use, Land management, Land development, Drainage, Floods, Flood control, Flood protection, Waste disposal, Sewage disposal, Channelization, Estuaries, Watersheds, Oily water, Groundwater, Contaminants, Agriculture, Industry.
Identifiers: *Coastal zone management.

The problems and importance of the Lake Charles region are considered. In a hearing held October 5, 1972, the uniqueness of the state's 7 million acres of coastal lands and its renewable natural resources and abundant mineral resources were stressed. The commercial fishing industry of the state depends upon the perpetuation of this coastal zone and is of national importance, representing 23% of the country's production of fish. The conflict arises between those interests dependent upon undisturbed natural resources and those which require disturbance of the environment to obtain their resources. Testimony and suggestions concerning the development and coastal zone management plans of the region were received from various governmental, agricultural and industrial interests familiar with the region, including the rice and soybean industries, drainage districts, fisheries and canneries, the League of Women Voters, shipping and dock facilities, and the State Conservation Commission. Some subjects of intensive study include: salt water intrusion, wildlife habitat preservation, pollution control, water quality, land use control, drainage, flooding, solid waste management, shipping, spills, channelization, estuary and watershed preservation and ground water contamination. (Silber-Florida)
W74-05786

CAN WE SAVE OUR SALT MARSHES,
Connecticut Agricultural Experiment Station, New Haven.
S. W. Hitchcock.
National Geographic, Vol 141, p 729-765, June 1972. 2 illus.

Descriptors: *Coastal marshes, *Salt marshes, *Marsh management, *Wildlife conservation, *Fish reproduction, *Commercial fish, Tidal marshes, Shallow water, Erosion, Mudflats, Water level fluctuations, Estuaries, Ocean currents, Tidal waters, Chemicals, Sewage, Wetlands.
Identifiers: Coastal zone management.

Salt marshes are disappearing before the onslaught of factories, dump and fill, and homes with a seaward view. Chemicals and sewage pollute the wetlands and developers rout the sportsmen and commercial fishermen. Seventy-five species of fish, at least, spend part of their lives in the salt marshes. The grass that developers destory is the basis of marsh life. The marsh vegetation supplies food and nutrition to many species including fiddler and blue-claw crabs. Many species gow in the confines of the marsh and then go out into the oceans. The marsh forms when waves shape sands into offshore barriers. Tidal creeks cut through these bars, flooding the coves behind them twice daily with seawater. Cordgrass sprouts in the shallows which slows tidal currents causing them to deposit their silt. This forms a floor of nutritive mud. During low tide many nutrients are flushed out to marine life offshore. Salt hay is grown in marshes and is in demand as mulch for gardens and strawberry beds. Wetlands are prime areas for development and are worth up to $110,000 an acre. Already many marshes have been destroyed. Still others are being used as garbage dumps and factory sites. (Sperling-Florida)
W74-05803

JACK AND THE DRAGLINE,
W. Blassingame.
Audubon, Vol 75, No 3, p 53-59, May 1973. 1 map, 1 photo.

Descriptors: *Florida, *Salt marshes, *Coastal marshes, *Estuaries, Aquatic hibitats, Channel improvement, Dredging, Administrative agencies, Gulf coastal plain, State governments, Regulation, Permits, Federal government, Economic aspects, Political aspects, Legal aspects, Legislation.
Identifiers: *Coastal waters, *Fill permits, Administrative regulations.

The development of the Big Bend area of North Florida is discussed. The Big Bend is a stretch of about three-hundred miles of saltwater marshes and winding creeks. These marshes produce and shelter more sealife than all the rest of Florida including the Everglades. They are presently being threatened by dredging and filling operations which destroy the estuarine life. Many dredging operations were taking place without the proper permits although both a state and federal permit are required to dredge. The developers have great influence over county commissions, and high state officials. Additionally, even environmentally-minded officials cannot prevent what old laws allow. For example, a Florida statute defines the position of the mean high-tide line at 1.4 feet above sea level. Along the table-flat coast, an inch may mean a half-mile or more of salt marsh. A better solution might be like that of the Georgia statute which defines its estuarine areas as all tidally influenced waters, marshes, and marshlands lying within a tide elevation range of 5.6 feet above mean tide level and below. (Sperling-Florida)
W74-05804

ENVIRONMENTAL LAW--ZONING--ORDINANCE PROHIBITING FILLING OF WETLANDS ADJACENT TO NAVIGABLE WATERS, WITHOUT PERMIT IS CONSTITUTIONAL EXERCISE OF POLICE POWER NOT REQUIRING COMPENSATION.
For primary bibliographic entry see Field 6E.
W74-05815

HYDRODYNAMICAL STABILITY OF SALT WEDGE,
Washington Univ., Seattle. Dept. of Oceanography.
F. A. Lee.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10276, p 17-24, January 1974. 4 fig, 6 ref, append. NSF Grant GA-30745X.

Descriptors: *Saline water intrusion, *Estuaries, *Stratified flow, Streamflow, Open channel flow, Hydraulics, Hydrodynamics, Mixing, Saline water-freshwater interfaces, *Shear, Fluid mechanics.
Identifiers: *Salt wedges.

The hydrodynamical stability of a salt wedge is described in terms of a simple example consisting of two layers of fluids in uniform shear. The upper fluid is lighter than the lower fluid and is bounded by a free surface at the top. Salt wedge stability was studied through the growing and decaying modes of the system. Neutral stability curves are given in terms of the wave number and the thickness ratio of the upper layer to the shear layer. The stabilizing influences of the free surface and the interface are dependent on the wave number. Critical values of the dimensionless parameter are predicted to occur between 0.1 and 0.6 (depending on the thickness of the upper layer), below which stable flows can persist; its minimum value (0.1) agrees with experimental measurements. (Knapp-USGS)
W74-05825

HYDRAULICS AND THERMAL DISPERSION IN AN IRREGULAR ESTUARY,
General Electric Co., Philadelphia, Pa. Re-Entry and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W74-05828

THE LAND WATER INTERFACE IN AN URBAN REGION: A SPATIAL AND TEMPORAL ANALYSIS OF THE NATURE AND SIGNIFICANCES OF CONFLICTS BETWEEN COASTAL USES,
Washington Univ., Seattle. Div. of Marine Resources.
For primary bibliographic entry see Field 6B.
W74-05872

FISHES, MACROINVERTEBRATES, AND HYDROLOGICAL CONDITIONS OF UPLANDS CANALS IN TAMPA BAY, FLORIDA,
National Marine Fisheries Service, St. Petersburg Beach, Fla. Gulf Coast Fisheries Center.
For primary bibliographic entry see Field 5C.
W74-05916

PRIMARY PRODUCTIVITY IN A NUTRIENT-LIMITED TROPICAL ESTUARY,
Hawaii Inst. of Marine Biology, Honolulu.
For primary bibliographic entry see Field 5C.
W74-05939

RESTRUCTURING OF RIVER BANKS AND SECONDARY POLLUTION: STUDY OF EUTROPHICATIONS IN PORT AREAS, (IN FRENCH),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5C.
W74-05950

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

HIGHLY MINERALIZED GROUNDWATER AND ITS UTILIZATION (PODZEMNYYE VODY POVYSHENNOY MINERALIZATSII I IKH ISPOL'ZOVANIYE),
M. R. Nikitin.
Akademiya Nauk SSSR Vestnik, No 11, p 52-58, November 1973. 3 fig.

Descriptors: *Water utilization, *Desalination, *Saline water, *Brackish water, *Groundwater, Groundwater resources, Freshwater, Maps.
Identifiers: *USSR, *Mineralization.

The vast resources of freshwater in the Soviet Union are unevenly distributed. As a result, many regions in southern European Russia, West Siberia, Kazakhstan, and Soviet Central Asia are experiencing a water deficit. This deficit can be remedied or alleviated by (1) more rational use of local freshwater resources; (2) introduction of excess water supplies from other regions; and (3) maximum utilization of local brackish and saline waters with a dissolved-salts content in the 1 to 35 g/liter range. First generalizations of data on brackish and saline groundwater in the USSR as a possible water-supply source were made by institutes of hydrogeology and engineering geology in Moscow (VSEGINGEO) and in Tashkent (GIDROINGEO) in 1965-69. Prospects of using highly mineralized groundwater depend mainly on progress in saline water conversion. Although the cost of desalting is still relatively high, interest in removal of salts from water has been stimulated by the degree of development and industrial application of distillation, freezing, electrodialysis, and reverse osmosis. Schematic maps show the distribution of brackish and saline groundwater in the USSR and the division of the country into provinces based on the geographic and stratigraphic occurrence of groundwater. (Josefson-USGS)
W74-05565

METHOD FOR MAKING A HOLLOW FIBER SEPARATORY ELEMENT,
Dow Chemical Co., Walnut Creek, Calif.
H. I. Mahon, G. C. Doss, D. A. Gavin, and D. B. Vang.
Available from NTIS as PB-220 737, $3.00 paper copy; $1.45 microfiche. Department of the Interior, Office of the Solicitor Patent Application Serial Number 206 793, December 1971. 16 p.

Descriptors: *Patents, *Desalination, Brines, *Separation techniques.
Identifiers: *Hollow fiber elements.

A process for making hollow fiber tube bundles which are usefully employed as separatory elements in various fluid separation devices for desalination of brines and like dialytic and osmotic separation purposes is described. Similar tube bundles prepared from plastic hollow fibers may also be used for heat exchange and other purposes. It is of special interest to prepare tube bundles composed of a large number of permeable, hollow fibers of very small diameter for desalination and other medical purposes such as a blood oxygenator, artificial kidney and the like. A moving belt of hollow fibers is prepared by winding a continuous length of hollow fiber (or fibers) transversely around a pair of moving guide members. The moving fiber belt is convolutely wound upon an axis generally transverse to the direction of movement of the belt to form a fiber bundle. A band of resin is applied to at least one transverse section of the hollow fiber and subsequently solidified to form a tube sheet. The separatory element is then prepared by cutting the tube sheet in a plane generally perpendicular to the bundle axis to form a tube sheet face portion having open fiber ends terminating therein. (Sinha - OEIS)
W74-05694

METHOD OF MAKING SODIUM CHLORIDE CONCENTRATE FROM SEA WATER,
Dow Chemical Co., Midland, Mich.
J. S. Best.
U.S. Patent No. 3,779,030, 3 p, 1 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 917, No 3, p 865, December 18, 1973.

Descriptors: *Patents, *Arctic, Ice, *Sea water, Freshwater, *Sodium chloride, Potable water, Equipment, *Desalination processes.

The method comprises the following steps: (a) adding sodium chloride to sea water to form an admixture having a concentration of sodium chloride within the range of 15 to 25 weight per cent; (b) cooling the admixture to a temperature within the range of 0 deg F to -8 deg F, whereby ice crystals are formed; (c) separating the ice crystals from the residual sodium chloride concentrate; (d) adding fresh sea water to the residual concentrate to form a second admixture having a sodium chloride concentration within the range of 15 to 25 weight per cent; and (e) recycling the second admixture through steps (b) - (e). In the Arctic the sodium chloride can be used as an additive to crude oil in Arctic pipelines to prevent freezing; the water may be used as drinking water. (Sinha-OEIS)
W74-05887

METHOD AND APPARATUS FOR DISTILLING FRESHWATER FROM SEAWATER,
E. E. H. Koivisto, and R. V. J. Saari.
U.S. Patent No. 3,783,108, 5 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 918, No 1, p 413, January 1, 1974.

Descriptors: *Patents, *Desalination, *Evaporation, *Condensation, *Distillation, Seawater, Freshwater, Equipment, Desalination apparatus.

Seawater pumped from the warm surface layers of the sea, or from a basin warmed by the sun or warmed by the low-temperature waste heat of a power plant or industrial process, is evaporated and the vapor produced is condensed by colder seawater. Non-condensable gasses dissolved in the water to be evaporated are removed before the water enters the evaporators and after the gasses have passed through the condensers. The water to be evaporated flows through a plurality of consecutive evaporators located at a roughly barometric height above sea level, in which part of it is evaporated and the rest returned to the level from which it was pumped into the evaporators. The vapor produced in the evaporators is condensed in corresponding condensers, which are cooled by colder seawater. The non-condensable gasses can be pumped out by mixing them with the cooling water leaving the condensers. (Sinha-OEIS)
W74-05901

3B. Water Yield Improvement

SUBSURFACE ASPHALT MOISTURE BARRIERS IN SANDY SOILS,
Delaware Univ., Newark. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W74-05412

THE MODIFICATION OF GREAT LAKES WINTER STORMS,
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
H. K. Weickmann.
Technical Report ERL 265-APCL 26, January 1973. 103 p, 84 fig, 7 tab, 49 ref.

Descriptors: *Snowfall, *Weather modification, *Great Lakes, Great Lakes Region, Cloud seeding, Mathematical models, Snow.

The mesoscale structure of Great Lakes winter storms shows that the heaviest precipitation falls near the shorelines and decreases in intensity farther downwind. This is partly caused by the diminishing intensity of the convective cloud systems as they move inland and away from the warm convective moisture source, and partly because the more intensive convective clouds produce heavy precipitation particles, like graupel and rimed snowflakes, that fall close to the shore while the lighter particles are carried farther inland. Consequently, if lighter precipitation particles could be formed through overseeding the clouds, the snow would be carried away from the shorelines and advected over a larger inland area. This was tested by seeding from the ground and air, tracking the seeding agent through the cloud system with an airborne freezing nucleus counter, and analyzing AgI nuclei in the precipitated snow crystals. Snowfall can probably be affected in the desired manner. However, there is a strong dependence on the cloud top temperature, which indicates that snowfall can be initiated, redistributed, or not be affected at all. No objective analysis of the seeding effect can be devised due to the great difficulties in accurately measuring the rate of snowfall. Unless the seeding efficiency of the generator used produces enough nuclei at the location in the cloud system where nuclei are needed, the effect is most likely irrelevant or lost in the background. Through application of comparative snow-crystal analysis, the plausibility that the Great Lakes winter storms belong to a more general category of shallow winter storms for which boundary layer flow constitutes an important origin was examined. This storm type occurs frequently not only in large-scale orogenic precipitation but also in large-scale cyclonic warm-front type snowstorms. (Knapp-USGS)
W74-05732

BOOM IN THE U.S. DESERT--CAN IT KEEP ROLLING.
U.S. News and World Report, Vol 75, p 51-56, September 17, 1973. 1 tab, 12 photo.

Descriptors: *Arizona, *Arid lands, *Reservoir operation, *Water conveyance, *Water distribution(Applied), Water shortage, Desalination plants, Forecasting, Pipelines, Aquifers, Irrigation systems, Aqueducts, Damsites, Hydroelectric plants, National monuments, Semiarid climates, Water supply development, Water resources development, Pumping, Water storage, Dams, Water utilization.
Identifiers: *Energy crisis.

The boom in the Southwest United States is discussed, and whether water and energy supplies will be available to enable the growth to continue. To date, attempted solutions to water supply problems have been long pipelines, reservoirs, and aqueducts. Problems are arising due to the energy crisis, since electricity is essential for pumping and there are no more major dam sites available for hydroelectric power. Phoenix obtains its water from a 70 year old irrigation project. Homes, offices, factories, and shopping centers have simply moved into the irrigated fields, taking over the water rights. These activities will probably cause food prices to rise. Presently under construction and due for completion in 1980 is an aqueduct from the Colorado River. One recent conflict between growth and the environment arose over Glen Canyon Dam. It provides peaking power to Southwest cities but the filling of Lake Powell behind the dam for storage of water would flood Rainbow Bridge National Monument. Problems such as this are everpresent, but they are recognized, and plans are being formulated to overcome them. (Sperling-Florida)
W74-05792

AUGMENTING WATER SUPPLIES OF THE VOLGA RIVER AND DIVERTING PART OF THE RUNOFF OF NORTHERN RIVERS SOUTHWARD (O POVYSHENII VODOOBESPECHENNOSTI R. VOLGI I PEREBROSKE CHASTI STOKA SEVERNYKH REK NA YUG),
I. A. Gerardi.
Gidrotekhnika i Melioratsiya, No 11, p 112-117, November 1973. 1 fig, 1 tab.

Descriptors: *Streamflow, *Flow augmentation, *Diversion, *Alteration of flow, *Water management(Applied), Water utilization, Water resources, Water resources development, Planning.
Identifiers: *USSR(Volga River).

In all important economic regions of the RSFSR, the Ukraine, republic of Soviet Central Asia, the Transcaucasus, Kazakhstan, and even Belorussia, the scale and tempo of development of productive resources in the next 20-30 years will depend, to a great extent, on measures to increase natural water resources. Annual renewable streamflow in these regions (including the Volga, Dnieper, Kuban' and Terek Rivers) is about 480 cu km or 10.5% of total streamflow in the USSR. In relatively dry (75% probability) and dry (95% probability) years, total streamflow in the European south of the USSR decreases to 417 cu km and 346 cu km, respectively. Normal supply of water to all branches of the national economy in river basins of southern European Russia can be achieved only through diversion of flow from other river basins. In European Russia there is an acute need for a single water management system of regulation and interbasin redistribution of flow, based on water resources of the Volga and on diversion of part of the flow of northern rivers into it. The main contributors to this system should be the northern rivers and lakes of northwest European Russia. Two plans are envisaged for diverting northern waters to the south: (1) the western plan which provides for transfer of part of the flow of northern rivers into upper reaches of the Volga River and into the Rybinsk Reservoir; and (2) the eastern plan, whereby water is redirected into upper reaches of the Kama River. (Josefson-USGS)
W74-05836

PUBLIC WATER SUPPLIES OF NORTH CAROLINA: PART I. NORTHERN PIEDMONT,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 6D.
W74-05858

3C. Use Of Water Of Impaired Quality

DETECTING SALINE SOILS IN THE RED RIVER VALLEY, MINNESOTA, BY REMOTE SENSING TECHNIQUES,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05519

HIGHLY MINERALIZED GROUNDWATER AND ITS UTILIZATION (PODZEMNYYE VODY POVYSHENNOY MINERALIZATSII I IKH ISPOL'ZOVANIYE),
For primary bibliographic entry see Field 3A.
W74-05565

ON THE NECESSARY AND SUFFICIENT CONDITIONS FOR A LONG-TERM IRRIGATED AGRICULTURE,
Economic Research Service, Davis, Calif. Farm Production Economics Div.
For primary bibliographic entry see Field 5B.
W74-05663

SEWAGE: THE SURPRISING RESOURCE,
California Attorney General's Environmental Task Force, Sacramento.
For primary bibliographic entry see Field 5D.
W74-05794

TECHNOLOGICAL MODIFICATION OF THE SEEDLING METHOD AND ANALYSIS OF ITS USEFULNESS FOR EVALUATION OF SALT TOLERANCE IN PLANTS,
Y. M. Ivanov, and G. V. Udovenko.

Available from the National Technical Information Service as TT-72-51131 $3.25 in paper copy, $1.45 in microfiche. Translation, TT-72-51131, 1973, 22 p, 2 tab, 31 ref. Trans. from Russian.

Descriptors: *Salt tolerance, *Resistance, *Seeds, *Germination, *Salinity, Saline soils, Salts, Metabolism, Reproduction, Plant growth, Viability, Plant physiology, Stress, Plant growth, Crop response, Growth rates, Plant growth regulators, Soil-water-plant relationships. Saline water, *Reviews.

A literature review is presented of the seedling method of salt tolerance in plants. This method involves the germination of seeds in a saline solution since the study of germination under field salinity conditions is impossible. The salt tolerance of the variety may thus be determined in light of specific environmental constraints placed upon the seedling. Several variations of the method include growth media, salinities, temperature, light, and nutrient considerations. Emphasis is placed on recent developments and modifications in the seedling method which has appeared in Russian literature. (Muller-Arizona)
W74-05920

3D. Conservation In Domestic and Municipal Use

EVAPORATION, INFILTRATION AND RAINFALL-RUNOFF PROCESSES IN URBAN WATERSHEDS,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-05405

INVESTIGATION OF POROUS PAVEMENTS FOR URBAN RUNOFF CONTROL,
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-05411

CONSTRUCTION OF WASTEWATER FACILITIES, LUFKIN, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Federal Highway Administration, Austin, Tex.
For primary bibliographic entry see Field 5D.
W74-05814

MASTER PLANNING METHODOLOGY FOR URBAN DRAINAGE,
Rice (Leonard) Consulting Water Engineers, Denver, Colo.
For primary bibliographic entry see Field 6A.
W74-05834

WATER AND SEWER NEEDS OF LOW INCOME FAMILIES FOR THE MID-CUMBERLAND REGION OF TENNESSEE.
Mid-Cumberland Council of Government, Nashville, Tenn.
For primary bibliographic entry see Field 5D.
W74-05870

SHAWNEE COMPREHENSIVE PLAN, WATER WORKS SYSTEM AND SANITARY SEWERAGE SYSTEM,
Benham-Blair and Affiliates, Inc., Oklahoma City.
For primary bibliographic entry see Field 5D.
W74-05871

REGIONAL WATER AND SEWER CAPITAL IMPROVEMENTS PROGRAM.
Northwest Missouri Regional Planning Commission, Maryville.
For primary bibliographic entry see Field 5D.
W74-05874

MANAGEMENT OF STORM DRAINAGE AND FLOOD CONTROL ACTIVITIES.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 5D.
W74-05878

PLANNING MANUAL FOR STORM DRAINAGE AND FLOOD CONTROL.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 5D.
W74-05879

FEASIBILITY OF COMBINED SOLID WASTE AND STORM DRAINAGE PROJECTS.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 4A.
W74-05880

3E. Conservation In Industry

STAFF REPORT ON COAL GASIFICATION: PROCESSES AND EFFECTS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W74-05416

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF R. E. GINNA NUCLEAR POWER PLANT UNIT I, ROCHESTER GAS AND ELECTRIC CORPORATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05422

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CATAWBA NUCLEAR STATION, UNITS 1 AND 2, DUKE POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05423

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1, SOUTHERN CALIFORNAI EDISON COMPANY AND THE SAN DIEGO GAS AND ELECTRIC COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05424

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED LIMERICK GENERATING STATION, UNITS 1 AND 2, PHILADELPHIA ELECTRIC COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05425

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05426

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE HADDAM NECK (CONNECTICUT YANKEE) NUCLEAR POWER PLANT, CONNECTICUT YANKEE ATOMIC POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05427

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF GRAND GULF NUCLEAR STATION UNITS 1 AND 2, MISSISSIPPI POWER AND LIGHT COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05428

WATER FOR INDUSTRIAL DEVELOPMENT IN CALHOUN, CHICKASAW, CHOCTAW, GRENADA, MONTGOMERY, WEBSTER, AND YALOBUSHA COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
R. Newcome, Jr., J. M. Bettandorff, and D. E. Shattles.
Mississippi Research and Development Center Publication, 1973. 64 p, 31 fig, 13 tab, 24 ref.

Descriptors: *Water supply, *Industrial water, *Mississippi, Surface waters, Groundwater, Hydrologic data, Data collections, Water yield, Streamflow, Transmissivity, *Water wells.

An investigation of the water resources of the area comprising Calhoun, Chickasaw, Choctaw, Grenada, Montgomery, Webster, and Yalobusha Counties, in north-central Mississippi, was begun in April 1970 to gather and disseminate facts on the quality and quantity of the water available for industrial use. The area represents six of the State's physiographic provinces, four of its large river basins, and most of its freshwater-bearing geologic units. The area also contains two major flood-control reservoirs, Grenada and Enid Lakes. Present water use is 17 mgd, practically all obtained from wells. A much larger usage could be supported by the streams, lakes and aquifers. The largest streams are the Yalobusha, Big Black, and Skuna Rivers, and the long-term average runoff from the area is 0.8 mgd per sq mi. Sustained dry-weather flow ranges from 0 to 0.04 mgd per sq mi. The chemical quality of the surface water in the study area is suitable without treatment for most industrial purposes. The fresh-groundwater section is 500 to 2,500 feet thick and contains aquifers ranging in age from Cretaceous to Pleistocene. The principal aquifers are confined and many are capable of yielding moderate to large supplies to wells. Permeabilities of 100 to 500 gpd per sq ft are common; transmissibilities of 2,000 to 55,000 gpd per ft were determined from pumping tests. The most productive wells are in the Meridian-upper Wilcox aquifer and several are pumped at nearly 1,000 gpm. Groundwater in the Cretaceous aquifers is highly mineralized and commonly has high concentrations of fluoride. The Tertiary aquifers have softer, less mineralized water. High concentrations of iron are present in water from all the aquifers. Most of the groundwater is alkaline. Temperatures of water from shallow aquifers are about 20 deg C from the deepest aquifers about 40 deg C. (Knapp-USGS)
W74-05525

CONSERVATION OF WATER AND REDUCTION OF POLLUTION BY USE OF SOLVENT SYSTEMS FOR COLORING TEXTILE MATERIALS: AN ECONOMIC OUTLOOK,
Auburn Univ., Ala. Dept. of Textile Engineering.
D. M. Hall, and W. S. Perkins.
Available from the National Technical Information Service as PB-229 848; $4.25 in paper copy, $1.45 in microfiche. Water Resources Research Institute, Auburn University, Bulletin 20, 1974. 19 p, 2 fig, 1 tab, 1 append. OWRR A-020-ALA(3).

Descriptors: *Textiles, *Dyes, *Solvents, Water conservation, Economic feasibility, Costs, Pollution abatement, Water quality control.
Identifiers: Perchloroethylene, Trichloroethylene, *Chlorinated solvents.

It is economically feasible to use chlorinated solvents to replace water as the transfer vehicle in the dyeing of polyester fibers. The chlorinated solvent system takes less time and can be recovered at a fraction of the heat requirements needed for water; however, other problems associated with the solvent system must be solved before such a system will be accepted by the textile industry.
W74-05535

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974 PART 6.
For primary bibliographic entry see Field 6E.
W74-05588

3F. Conservation In Agriculture

NITROGEN UPTAKE EFFICIENCY BY FOUR PLANT SPECIES IN THE FIELD AND GROWTH CHAMBER,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W74-05404

MICROCLIMATE MANAGEMENT BY TRADITIONAL FARMERS,
Colorado State Univ., Fort Collins.
G. C. Wilken.
Geographical Review, Vol 62, No 4, p 544-560, 1972.
Identifiers: *Climate management, *Ground cover, Microclimates, Mulches, Tillage systems, Vegetation, *Windbreaks, *Crops, Farm management.

Fluxes of energy, heat and moisture that produce distinctive crop microclimates are controlled by surface shade, albedo, conductivity and geometry. Traditional farmers use vegetation, tillage systems, mulches, and man-made structures to modify surface characteristics and thus the microclimates. Windbreaks and groundcovers protect plants from the mechanical forces of wind and rain or hail and inhibit dispersal of natural or modified microclimates. Although descriptive evidence of climate management by traditional farmers is abundant, quantitative data to evaluate the effectiveness and the extent of particular practices are scarce. Nevertheless, climate should be added to the list of environmental factors over which traditional farmers exercise significant control.--Copyright 1973, Biological Abstracts, Inc.
W74-05452

APPLICATIONS OF AERIAL PHOTOGRAPHY AND ERTS DATA TO AGRICULTURAL, FOREST AND WATER RESOURCES MANAGEMENT.
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05515

CORN DEFOLIATION SURVEYS,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05520

ALFALFA CROP PRODUCTIVITY ANALYSIS,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05521

DEVELOPMENT OF PREDICTION RELATIONSHIPS FOR WATER REQUIREMENTS WITH IRRIGATION COOLING,
Kentucky Water Resources Inst., Lexington.
B. J. Barfield, J. N. Walker, and F. A. Payne.
Available from the National Technical Information Service as PB-229 791; $3.25 in paper copy, $1.45 in microfiche. Research Report No. 70, 1974. 49 p, 13 fig, 2 tab, 1 graph, 29 ref, 2 append. OWRR A-028-KY(1). 14-31-0001-3217 and 14-31-0001-3517.

Descriptors: Irrigation, *Evapotranspiration, *Energy budget, Leaves, Temperature, Model studies, Mist irrigation, *Forecasting, Cooling, Sorghum, *Water requirements.
Identifiers: Plant temperatures, Energy balance, *Leaf temperatures, Arizona sorghum.

A model for predicting leaf temperatures during an off-on mist cycle is presented. The model uses a combination of energy budget and aerodynamic techniques. The model was tested for dry leaf temperature and evapotranspiration predictions using average hourly data from Arizona. The accuracy was good. It was also tested for dry leaf temperature predictions using two to three minute data with a widely varying net radiation. When reasonable values of stomatal resistance were used, the agreement was again good. The model was tested for prediction of wet leaf temperature with a ten minute on, fifty minute off mist irrigation cycle. The agreement was fair when using reasonable input parameters. The poorest predictions were during the mist on cycle. (Grieves-Kentucky)
W74-05539

PRIMER ON AGRICULTURAL POLLUTION,
For primary bibliographic entry see Field 5B.
W74-05569

WATER-USE EFFICIENCY AND ITS RELATION TO CROP CANOPY AREA, STOMATAL REGULATION AND ROOT DISTRIBUTION,
Kansas Agricultural Experiment Station, Manhattan, Evapotranspiration Lab.
I. D. Teare, E. T. Kanemasu, W. L. Powers, and H. S. Jacobs.
Agron J. Vol 65, No 2, p 207-211. 1973. Illus.
Identifiers: *Crop canopy, Distribution, *Evapotranspiration, Glycine-Max, *Root system, *Sorghum, *Stomatal, Transipiration, *Soybeans, Water utilization.

The differences in water-use efficiency between sorghum (Sorghum bicolor (L.) Moench) and soybean (Glycine max (L.) Merrill) were compared in terms of leaf area index (LAI), size of root system, canopy stomatal resistance (Rc), net assimilation rate (NAR), and evapotranspiration (ET). The field water budget was measured by recording the rainfall and irrigation water applied in relation to the ET as measured with 2 weighing lysimeters. The evapotranspiration rates of the 2 crops began to diverage about Aug. 15. This was the period when the soybean canopy began to close and the soybean LAI increased to about 1.5 times that of sorghum. NAR for sorghum during stalk elongation and heading (Aug. 15) was nearly 4 times that of soybeans during that time. Divergence of the 2 evapotranspiration curves coincided with observed differences in canopy stomatal resistance. In Aug. after a stress period, the Rc for sorghum at 1 and 3 pm was nearly 3 times the Rc for soybeans. The increase in Rc for sorghum was concomitant with an air temperature increase of 3C above the air temperature near soybeans. Sorghum had approximately twice the weight of roots per volume of soil as soybeans. Even though atmospheric demand for water was similar for the 2 crops, sorghum was able to close its stomata more than soybeans, and thus conserve soil water even with a larger root system and more water in the soil profile rsulting from reduced evapotranspiration. Water-use efficiency of sorghum (g DM/kg H2O) was approximately 3 times that of soybeans on dry matter or grain yield bases.--Copyright 1973, Biological Abstracts, Inc.
W74-05621

SOME EVIDENCE OF STOMATAL RESTRICTION OF EVAPORATION FROM WELL-WATERED PLANT CANOPIES,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
For primary bibliographic entry see Field 2D.
W74-05662

WATER-YIELD RELATIONS FOR NON-FORAGE CROPS,
New South Wales Dept. of Agriculture, Leeton (Australia). Agricultural Research Station.
L. A. Downey.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IR1, p 107-115, March, 1972. 3 fig, 13 ref.

Descriptors: *Irrigation practices, *Water distribution(Applied), *Water demand, *Water requirements, *Irrigation efficiency, Irrigation engineering, Soil moisture, Cost-benefit ratios, *Evapotranspiration, Grains(Crops), Irrigation, Water balance, Consumptive use.
Identifiers: Water deprivation, Agricultural products.

The relationship between soil moisture stress, evapotranspiration, and marketable yield of crops - where the yield is a reproductive organ or associated product - is examined. Under conditions of constant stress, yield is reduced as a linear function of stress. Where stress is applied at different stages in the development of the crop, no simple reltionship exists. To predict yield from the water available or from evapotranspiration, the severity of stress and the physiological stage of development must be defined. A disproportionate reduction in yield is induced by water stress during the phases of reproduction corresponding to the period of peak evapotranspiration. Therefore, if irrigation engineers cannot plan their systems for times of peak demand, cost-benefit analyses should reflect probable yield reductions. (Skogerboe-Colorado State)
W74-05665

MOVEMENT OF NITRATES UNDER IRRIGATED AGRICULTURE,
Nebraska Univ., Lincoln. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 5B.
W74-05666

WATER REQUIREMENTS OF ROSTERED IRRIGATION SCHEMES,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
P. D. Fitzgerald, and G. C. Arnold.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IR1, p 91-96, March, 1972. 1 fig, 3 tab, 4 ref.

Descriptors: *Irrigation practices, *Irrigation systems, Water distribution(Applied), *Computer models, Distribution systems, Water delivery, Water demand, Irrigation engineering, Irrigation efficiency, Surface irrigation, Irrigation, Water allocation(Policy), Water requirements, Soil moisture, *Rotations.
Identifiers: *New Zealand, Irrigation scheduling.

A method is given whereby the water requirements of a rostered (rotation) irrigation scheme can be determined by considering the length of the roster period and the calculated soil moisture deficit at which irrigation is applied. From this the

storage likely to be needed can be calculated. The method is computer processed so variations can easily be studies. An example of its application to the Irrigation Schemes of Mid-Canterbury, New Zealand, is given. (Skogerboe-Colorado State)
W74-05667

SELF-CLOSING IRRIGATION PIPE VALVE,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 8B.
W74-05670

SUBSURFACE DISTRIBUTION OF NONUNIFORMLY APPLIED SURFACE WATERS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
W. E. Hart.
Transaction of the ASAE (American Society of Agricultural Engineers), Vol 15, No 4, p 656-661, July-August, 1972. 14 fig, 1 tab, 13 ref.

Descriptors: *Irrigation practices, *Irrigation design, *Sprinkler irrigation, *Irrigation systems, Uniformity coefficient, Computer models, Application methods, Application equipment, Sprinkling, Crop production.

Sprinkler irrigation systems are evaluated by determining the uniformity of water as it is applied to the surface of the ground. The plant responds to the distribution of the water as it occurs within the soil. The gradients existing within the unevenly wetted soil move moisture laterally (and vertically) within the profile, causing the water within the soil to be more uniformly distributed than indicated by the initial, surface-measured distribution. The extent of this movement throughout the soil, within a reasonable length of time, appears to be a function of the following variables: initial moisture content, average application rate, distribution of water as applied to the surface, length modulus, soil type, and total applied water. Current methods of designing irrigation systems, which are based almost exclusively on anticipated initial uniformity, are inadequate if the aim of the design is to provide the most economical system possible. (Skogerboe-Colorado State)
W74-05671

IRRIGATION IN ANCIENT MESOPOTAMIA,
Illinois Univ., Urbana. World Heritage Museum.
For primary bibliographic entry see Field 4A.
W74-05673

VOLUME BALANCE METHOD FOR COMPUTING INFILTRATION RATES IN SURFACE IRRIGATION,
Orissa Univ. of Agriculture and Technology, Bhubaneswar (India).
R. Lal, and A. C. Pandya.
Transactions of the ASAE (American Society of Agriculture Engineers), Vol 15, No 1, p 69-72, January-February, 1972. 4 fig, 2 tab, 7 ref.

Descriptors: *Irrigation practices, *Irrigation efficiency, Infiltration, *Surface irrigation, Irrigation design, *Infiltration rates, Unsaturated flow, Irrigation, Irrigation engineering.

Based upon the equation of continuity an empirical infiltration equation can be developed from the water measurements during surface irrigation. This so called volume balance method of calculating infiltration rate from surface irrigation data is most practical as it presents the actual mean conditions that exist during irrigation application. For high degree of accuracy, small time increment may be taken and calculations involved can be conveniently done by using computer techniques. An example of computation based upon field data collected at the Indian Institute of Technology, Kharagpur, India, is presented to show how the method is used. Copies of the computer program are available on request from the authors. (Skogerboe-Colorado State)
W74-05674

SOIL STORAGE LIMITATIONS ON EFFLUENT IRRIGATION,
Missouri Univ., Columbia. Dept. of Forestry.
For primary bibliographic entry see Field 5D.
W74-05676

ESTIMATION PROCEDURES FOR RESPONSE FUNCTIONS OF CROPS TO SOIL WATER CONTENT AND SALINITY,
Hebrew Univ., Jerusalem (Israel). Dept. of Agricultural Economics.
D. Yaron, H. Bielorai, J. Shalhevet, and Y. Gavish.
Water Resources Research, Vol 8, No 2, p 291-300, April, 1972. 6 tab, 4 fig, 21 ref.

Descriptors: *Salinity, *Irrigation practices, *Crop response, *Soil-water-plant relationships, Soil moisture, Soil chemistry, Crop production, Soil environment, Soil management, Agricultural engineering, *Soil water, Estimating.

The specification and estimation procedures of the response functions of crops to soil water content and salinity are presented. The conceptual framework is discussed, and the application of the suggested procedures is illustrated by an analysis of two irrigation experiments. The possibility of positive correlations between soil salinity, soil water content, and crop yield is discussed, and possible erroneous evaluations of the effect of salinity on crop yield in such situations are pointed out. (Skogerboe-Colorado State)
W74-05678

RECESSION FLOW IN SURFACE IRRIGATION,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W74-05679

SHAPE FACTORS IN IRRIGATION WATER ADVANCE EQUATION,
Uttar Pradesh Agricultural Univ., Naini Tal (India). Dept. of Agricultural Engineering.
P. Singh, and H. S. Chauhan.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IR3, p 443-458, September, 1972. 10 fig, 1 tab, 9 ref.

Descriptors: *Irrigation practices, *Irrigation design, Hydraulics, *Surface irrigation, Flow, Irrigation engineering, *Infiltration rates, Soil mechanics, Soil physics, Irrigation.

Utilizing empirical advance and infiltration functions, relationships for surface and subsurface storage shape factors have been obtained. The surface and subsurface shape factors as expressed by these relationships are functions of time and infiltration characteristics of soil. Incorporating these relationships, a continuity equation has been written for advance in surface irrigation. The equation for advance of water compares well with field data and relationships of other workers. (Skogerboe-Colorado State)
W74-05681

ELEMENTAL COMPOSITION AND RESPONSE TO NITROGEN OF SUNFLOWER AND CORN,
Minnesota Univ., St. Paul. Dept. of Agronomy and Plant Genetics.
R. G. Robinson.
Agron J. Vol 65, No 2, 318-320, 1973.
Identifiers: *Corn(Field), Depletion, Irrigation, *Nitrogen, Nutrients, Soils, *Sunflower, *Fertilizers, Crop yield.

Comparison was made between sunflower (Helianthus annuus L.) and corn (Zea mays L.) in yield, elemental composition, response to N fertilizer and removal of nutrients from the soil. The crops were grown on silt loam soil with and without N applied at various times and on sandy soil with and without N and irrigation. N at 75 or 150 kg/ha failed to significantly increase yield of either crop on fertile silt loam soils. On droughty sand, N at 224 kg/ha increased sunflower yield, but both irrigation and N were needed to significantly increase corn yield. Treatments within a trial did not affect elemental composition except where treatment altered yield. Sunflower achenes and vegetative parts had greater concentrations of most elements than did corn. However, the higher yield of corn offset this and resulted in greater soil depletion of most elements. Concentrations are given of N, P, K, S, Ca, Mg, Na, Sr, Al, Fe, Zn, Cu, Mo, Mn, and B in corn and sunflower stems and leaves in prebloom stage and in mature sunflower achenes, sunflower stover, corn caryopses, and corn stover. Sunflower yields were 35-40% those of corn under favorable soil fertility and moisture conditions. Sunflower ranks below corn as a soil-depletive crop.--Copyright 1973, Biological Abstracts, Inc.
W74-05703

AQUACULTURE: PROBLEMS WITH THE PROMISE,
H. Pennington.
Oceans, Vol 5, No 1, p 43-49, January-February 1972. 6 photo.

Descriptors: *Fish farming, Aquatic productivity, *Farm ponds, *Fish harvest, Fish populations, Fish hatcheries, Fish stocking, Pounds fish per acre, Fish reproduction, Food habitats, Fish management, Growth stages, Economic aspects, Commercial fishing, *Aquiculture, Oceans, Coasts, Fisheries, Foods, Aquatic animals, Fish, Shellfish, Farming.
Identifiers: *Coastal waters, *Prawns.

Fish farming is one potential food source for the future. Some forms of seafood cultivation have been practiced since 475 B.C. Genetic control of aquatic creatures is important to produce fast growing animals on lesser amounts of food. First, the goal of aquaculturists is to raise fish from one generation to the next under controlled conditions. The few ventures in commercial aquaculture in the United States have concentrated on high priced luxury seafood items, grown from larvae captured in the wild. From 1954 to 1968 the ocean's fish yield tripled, but in 1969 the catch was over a million tons less than in 1968 even though there were more fishing vessels. Despite the fact that fish farming has been practised for centuries very little research has been carried out. If the ocean is to provide a new food source for the future, its yield must be increased by aquaculture. Research is needed with regard to particular species in order to determine the maximum yields. (Sperling-Florida)
W74-05802

COMPLEX USE OF VOLGA WATER RESOURCES (KOMPLEKSNOYE ISPOL'ZOVANIYE VODNYKH RESURSOV VOLGI),
I. N. Lisitsyna, and V. L. Ronin.
Gidrotekhnika i Melioratsiya, No 11, p 109-112, November 1973. 1 fig.

Descriptors: Water resources, *Water utilization, *Water control, *Irrigation systems, *Irrigation programs, Agriculture, Water conservation, Water pollution control.
Identifiers: *USSR(Volga River).

Average long-term runoff of the Volga River is more than half of all the water resources of river basins in the European south of the USSR. Principal water users in the Volga River basin are agriculture, the fishery economy, hydroelectric

power, navigation, and industry. A total of 96 irrigation and flood-irrigation systems have already been constructed or are scheduled for construction in the Volga River region. Water conservation measures deemed essential to the Volga basin include: (1) industrial water recycling; (2) improvement in production technology and introduction of rational industrial processes; and (3) maximum curtailment of discharges of both treated and untreated sewage into rivers and water bodies. The CPSU Central Committee and USSR Council of Ministers in a 1972 decree 'On Measures to Prevent Pollution of the Volga and Ural River Basins With Untreated Sewage' have formulated measures aimed at complete treatment of sewage in the basin by 1980. Continued growth of all branches of the national economy in the basin will result in large irretrievable withdrawals of runoff. By 1985, water consumption in the basin may reach 42 cu km/yr, and lead to changes in the water balance of the Caspian Sea and to a decline in sea level. Measures are outlined for stabilizing the level of the sea and for preserving the Northern Caspian as a highly productive water body. (Josefson-USGS)
W74-05837

INFLUENCE OF HYDROGEN FLUORIDE FUMIGATION ON THE WATER ECONOMY OF SOYBEAN PLANTS,
Purdue Univ., Lafayette, Ind. Dept. of Horticulture.
B. W. Poovaiah, and H. H. Wiebe.
Plant Physiol. Vol 51, No 2, p 396-399. 1973. Illus.
Identifiers: *Fluorides, *Fumigation, Glycine-Max, Hydrogen fluoride, Necrosis, *Soybean, *Transpiration, Stomatal closure, Water potential.

The influence of hydrogen fluoride fumigation on water economy was studied using soybean (Glycine max (L.) Merr.). Fumigation caused partial stomatal closure in 1 hr and practically complete closure within 4 hr. The transpiration rate was greatly reduced by fumigation, while the leaf temperature was increased. Water potential increased after 1 day but fell drastically when necrosis occurred. Effects of interrupted fumigation during the day were somewhat less severe in all respects than those of continuous fumigation; nighttime fumigation caused only minor effects. Fluoride uptake was also much less from nighttime than from daytime fumigations.--Copyright 1973, Biological Abstracts, Inc.
W74-05838

SITE EVALUATION ACCORDING TO SOIL MOISTURE CONTENT AND ECESSARY IMPROVEMENT PRACTICES IN THE USSR,
Main Geophysical Observatory, Leningrad (USSR).
For primary bibliographic entry see Field 2G.
W74-05841

PERMEATION OF UNCHARGED ORGANIC MOLECULES AND WATER THROUGH TOMATO ROOTS,
Department of Agriculture, South Perth (Australia).
M. W. Perry, and H. Greenway.
Ann Bot (Lond). Vol 37, No 149, p 225-232. 1973, Illus.
Identifiers: Membranes, *Organic molecules, *Permeation, *Root systems, *Tomato roots, Xylem, Glycols, Glucose, Raffinose.

Permeation of ethylene glycol, D-mannitol, L-glucose, and raffinose through excised tomato roots was investigated. Solute transport from external solution to the xylem sap was determined at various rates of exudate flow achieved in turn by application of different pressures to the solution surrounding the roots. At an applied pressure of 2 bar, steady-state solute concentrations expressed as a percentage of external concentrations were, 52% for ethylene glycol, 3-4% for mannitol and glucose, and 1% for raffinose. Such relationships between the chemical structure of the solute and its concentration in the xylem sap are similar to those demonstrated by other workers for solute permeation into single cells. Thus in the present experiments most of these solutes presumably flowed through at least one membrane before reaching the xylem. The data also indicate that the flow of water via wholly extracellular pathways was slight, at most, 1% of the total flow reaching the xylem via this route.--Copyright 1973, Biological Abstracts, Inc.
W74-05852

AN ECONOMIC ANALYSIS OF ALTERNATIVE SPRINKLER IRRIGATION DISTRIBUTION SYSTEMS ON THE SOUTHERN HIGH PLAINS OF TEXAS,
Texas A and M Univ., College Station. Dept. of Agricultural Economics and Rural Sociology.
R. D. Lacewell, and J. C. Pearce.
Resource Development Workgroup, Departmental Technical Report 73-4. September 1973. 91 p, 5 fig, 12 tab, 29 ref, 5 append.

Descriptors: *Irrigation systems, *Sprinkler irrigation, *Economic feasibility, Irrigation water, Pumping, Model, Recharge, *Texas, Water distribution(Applied).
Identifiers: *Ogallala Formation(Tex), Southern High Plains(Tex).

A model is presented for evaluating sprinkler irrigation distribution systems relative to their effect on the economic life and value of an exhaustible irrigation water supply. The model traces the beginning water resource situation and sequentially allocates irrigation water annually until economic exhaustion of irrigation water occurs. The area of study was the Ogallala Formation in the Southern High Plains of Texas which was determined to be an exhaustible aquifer because of a small annual recharge in comparison with the quantity of water pumped annually for irrigation use. Alternative systems investigated included the hand-move, side-roll, and pivot irrigation distribution systems. (Mastic-Arizona)
W74-05924

IRRIGATION SYSTEM,
R. P. Hammond, and J. W. Michel.
Available from the National Technical Information Service as PAT APPL-228 676(70), $3.00 in paper copy, $1.45 in microfiche. Atomic Energy Commission Patent Application Serial Number 228, 676(70), February 1972. 8 p, 3 fig.

Descriptors: *Patents, *Irrigation systems, *Subsurface irrigation, Arable land, Irrigation design, Irrigation efficiency, Irrigation systems, *Irrigation engineering, Pipes, Water distribution(Applied), Design.
Identifiers: *Trickle Irrigation.

Subsurface and trickle irrigation techniques have received attention in recent years as potential methods for increasing irrigation efficiency in the agriculture of arid lands. A spring mechanism is used on slits in plastic distribution pipe to control the size of the aperture at operating water pressures. Such a spring assures the opening of the slit at a given pressure and also increases the closing pressure. A detailed description of the system is presented as are several preferred embodiments. The system tends to make all the slits operate simultaneously in response to pressure pulses, which also clean the slits of debris. The length of pipe in each system may be increased due to the higher operating pressure, and gaseous fertilization may be introduced through the system. The system is economical in that it may be installed mechanically at low cost and it employs a smaller amount of irrigation water than other methods. (Muller-Arizona)
W74-05928

THE INFLUENCE OF DROUGHT ON THE GROWTH, YIELD AND COMPOSITION OF THE FIELD BEAN, (IN FRENCH),
Institut National de la Recherche Agronomique, Dijon (France).
S. Meriaux.
Ann Agron (Paris). Vol 23 No 5, p 533-546. 1972. Illus. English summary.
Identifiers: *Bean, *Drought, *Growth(Beans), Photosynthesis, Transpiration, *Crop yield, Crop production.

The plant shows a high rate of growth during pod formation. Drought does not affect the biochemical composition of the plant, apart from transient accumulative phenomena in a number of simple synthesis compounds. The yield of seeds and net photosynthesis are closely associated with transpiration. Seed yield depends on the duration of drought especially during the fruiting stage.--Copyright 1973, Biological Abstracts, Inc.
W74-05941

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, FOURTH VOLUME.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 6A.
W74-05401

DETERMINATION OF DISCHARGE-FREQUENCY RELATIONSHIPS UTILIZING NON-LINEAR HYDROGRAPHS AND A MODIFIED RATIONAL FORMULA,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 2A.
W74-05406

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO: MIDDLE RIO GRANDE REGION,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W74-05408

RESERVOIR STORAGE AND THE THERMAL REGIME OF RIVERS, WITH SPECIAL REFERENCE TO THE RIVER LUNE, YORKSHIRE,
Durham Univ. (England).
M. E. Lavis, and K. Smith.
Sci Total Environ. Vol 1, No 1, p 81-90. 1972. Illus.
Identifiers: *Reservoir storage, Rivers, *Thermal regime, *United Kingdom(River Lune), Yorkshire, *Water temperature, Reservoir construction.

The effect of reservoir construction on downstream water temperatures was studied. Following an outline of the general mechanisms involved in such thermal modifications, a case study of the Yorshire Lune (United Kingdom) employing field observations collected over a 2 yr period is described. Emphasis is placed on the extent to which the natural range of stream water temperature variation is suppressed by the 2 direct-supply reservoirs on this river.--Copyright 1973, Biological Abstracts, Inc.
W74-05464

APPLICATIONS OF AERIAL PHOTOGRAPHY AND ERTS DATA TO AGRICULTURAL, FOREST AND WATER RESOURCES MANAGEMENT.
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05515

FOREST DISEASE DETECTION AND CONTROL,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05516

EVALUATION OF PEATLAND WATER TABLE ELEVATION AND WATER QUALITY INDICATORS,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05517

FOREST VEGETATION CLASSIFICATION AND MANAGEMENT,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05518

NEW DIRECTIONS IN U.S. WATER POLICY--SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FROM THE FINAL REPORT OF THE NATIONAL WATER COMMISSION.
National Water Commission, Arlington, Va.
For primary bibliographic entry see Field 6B.
W74-05522

WATER FOR INDUSTRIAL DEVELOPMENT IN CALHOUN, CHICKASAW, CHOCTAW, GRENADA, MONTGOMERY, WEBSTER, AND YALOBUSHA COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 3E.
W74-05525

GUIDELINES FOR DEALING WITH FLOODS ON HAY CREEK.
Army Engineer District, Philadepa.
January 1973. 8 p, 3 fig.

Descriptors: *Floods, *Flood protection, Flood control, *Pennsylvania, *Flood plain zoning, Flood plain insurance, Non-structural alternatives.
Identifiers: Hay Creek(Penn).

The Hay Creek Watershed drains 22.2 square miles in Berks County. From its source, the stream flows in a northerly direction through Birdsboro into the Schuylkill River. The Borough of Birdsboro, located along the downstream reach, is completely urbanized with commercial properties, transportation facilities, and private residences and has been subjected to frequent flooding. The flooding problem can be attributed to the following causes: insufficient in-bank capacity to contain the quantity of flow which accompanies heavy rainfall; inadequate capacity of bridges to pass the quantity of flow which accompanies heavy rainfall; and backup from high stages in the Schuylkill River. Despite the expenditure of tax funds running into billions of dollars for flood-control works, the increase in flood damages has led to a new approach for reducing these damages. This approach is the application of control over the use of land lying adjacent to the river through the planned development and management of flood-hazard areas. While flood-plain areas can probably never be considered floodfree, planning will allow selection of a flood risk according to the type of development desired. This will assure a reasonable level of protection during initial construction of a project. In addition, measures are given for reducing or preventing flood damages. (Knapp-USGS)
W74-05532

EXTENDED PERIOD SIMULATION OF WATER DISTRIBUTION NETWORKS,
Systems Control, Inc., Palo Alto, Calif.
H. S. Rao, D. W. Bree, Jr., and R. Benzvi.
Available from the National Technical Information Service as PB-230 148; $5.00r copy, $1.45 in microfiche. Final Report, February 1974. 150 p, 29 ref, 1 append. OWRR-C-4164(9027)(1).

Descriptors: *Simulation analysis, *Water distribution(Applied), *Control systems, *Computer programs, *Networks, Model studies, California, *Reservoir operation, Design data, Pumps, Valves, Storage, Municipal water.
Identifiers: *Extended period simulation, San Jose(Calif).

An extended period simulation procedure was developed for metropolitan water distribution networks. Efficient sparsity programming techniques were applied to obtain static network balances using a modified Newton-Raphson technique. An integration scheme was developed to link several static solutions each representing an interval of time. A program, called WATSIM, was developed and tested using field data provided by the San Jose Water Works, San Jose, California. Data included network data, switching data, parabolic characteristics of pumps, reservoir curves, and time varying demand patterns. Three cases were simulated: normal operation, emergency operation, and pump outage conditions. A 24-hour simulation of a 325 node, 450 line network was performed on UNIVAC 1108 computer and took 8.5 minutes of execution time and included approximately 100 static balances. An analysis was also performed to determine research needs for computer control of water distribution systems. It was concluded that the development of extended period simulation capability is an important step in providing tools for analysis and control of water networks.
W74-05533

AN EMPIRICAL MATHEMATICAL MODEL OF AN INTERCONNECTED WATERSHED SYSTEM,
Pennsylvania State Univ., University Park. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 2A.
W74-05543

RESERVOIRS, THEIR EFFECT ON NATURE AND THE ECONOMY, AND PRINCIPLES OF CONSTRUCTION (VODOKHRANILISHCHA, IKH VLIYANIYE NA PRIRODU I KHOZYAYSTVO, PRINTSIPY SOZDANIYA),
For primary bibliographic entry see Field 8A.
W74-05564

HIGHLY MINERALIZED GROUNDWATER AND ITS UTILIZATION (PODZEMNYYE VODY POVYSHENNOY MINERALIZATSII I IKH ISPOL'ZOVANIYE),
For primary bibliographic entry see Field 3A.
W74-05565

WATERSHED MODELS: TOOLS IN PLANNING LAND MANAGEMENT FOR WATER AND POLLUTION CONTROL,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 2A.
W74-05570

FLOOD PROBLEMS IN CERTAIN AREAS OF THE HACKENSACK RIVER BASIN; SADDLE RIVER BASIN; PASSAIC RIVER BASIN; AND POMPTON RIVER BASIN--STATE OF NEW JERSEY.
For primary bibliographic entry see Field 6E.
W74-05584

THE COLUMBIA RIVER TREATRY: THE ECONOMICS OF AN INTERNATIONAL RIVER BASIN DEVELOPMENT,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-05585

WATER RESOURCES DEVELOPMENTS AND NAVIGATIONAL IMPROVEMENTS IN ALASKA.
For primary bibliographic entry see Field 6E.
W74-05587

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974 PART 6.
For primary bibliographic entry see Field 6E.
W74-05588

DELAWARE RIVER BASIN COMMISSION: ANNUAL REPORT 1973.
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 6E.
W74-05589

A BILL AUTHORIZING THE CONSTRUCTION, REPAIR, AND PRESERVATION OF CERTAIN PUBLIC WORKS ON RIVERS AND HARBORS FOR NAVIGATION, FLOOD CONTROL, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-05592

EFFECT OF WATER-TABLE HEIGHT ON ROOT DEVELOPMENT OF PINUS CONTORTA ON DEEP PEAT IN SCOTLAND,
Macaulay Inst. for Soil Research, Aberdeen (Scotland).
For primary bibliographic entry see Field 2I.
W74-05617

PARKLAND PLANNING AND LAKE MANAGEMENT IN THE ROCK RIVER BASIN.
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W74-05624

INTERNATIONAL MANAGEMENT OF THE RIO GRANDE BASIN - THE UNITED STATES AND MEXICO,
University of Western Ontario, London. Dept. of Geology.
J. C. Day.
Water Resources Bulletin, Vol 8, No 5, p 935-947, October, 1972. 3 fig, 18 ref.

Descriptors: *International waters, *Rio Grande River, *International Bound and Water Comm, *Water management(Applied), *United States, *Mexico, Interstate rivers.
Identifiers: International water management.

Mexico and the United States forged a common program to manage water and related land on the Rio Grande. Actions of Rio Grande Commissions related to stream gaging, boundary definition, and multiple-purpose construction projects are among the more successful international water-management efforts in the world. Cost-sharing arrangements promoted rapid completing of international works. Joint action accomplished only part of expectations. International developments were com-

petitive rather than complementary until basin water appropriation was virtually complete. Commissions were not employed to consider long-range competitive water needs, or regional water requirements, throughout the basin. International groundwater use coordination does not exist. International structures produce less than anticipated benefits. Hydroelectric generators are financial liabilities, irrigated acreage exceeds dependable streamflow, and soil salinization is experienced. Unanticipated environmental changes occurred in every major program. The Rio Grande experience points to the need for society to specify goals to which the use of water should contribute and specify priorities for water use among different sectors of river basins and various segments of society. (Skogerboe-Colorado State)
W74-05664

IRRIGATION IN ANCIENT MESOPOTAMIA,
Illinois Univ., Urbana. World Heritage Museum.
S. T. Kang.
Water Resources Bulletin, Vol 8, No 3, p 619-624, June, 1972. 2 fig.

Descriptors: *Irrigation practices, *Salinity, Crop production, *History, *Silting, Irrigation systems.
Identifiers: *Iraq(Mesopotamia).

A translation of the cuneiform text written on clay tablets is presented. These writings are the day-by-day records of early irrigation activities. The problems of salinization and silting were very evident. The government of modern Iraq is using this information to locate and restore some of the irrigation systems. Decreased production, with time, is shown. These writings can be of benefit to modern man. (Skogerboe-Colorado State)
W74-05673

VOLUME BALANCE METHOD FOR COMPUTING INFILTRATION RATES IN SURFACE IRRIGATION,
Orissa Univ. of Agriculture and Technology, Bhubaneswar (India).
For primary bibliographic entry see Field 3F.
W74-05674

MEASUREMENT OF UNSATURATED HYDRAULIC CONDUCTIVITY BY THE CONSTANT OUTFLOW METHOD,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W74-05675

WATER TABLE AND SOIL MOISTURE PROBABILITIES WITH TILE DRAINAGE,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W74-05677

RECESSION FLOW IN SURFACE IRRIGATION,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
I. Wu.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IR1, p 77-90, March 1972. 6 fig, 1 tab, 9 ref.

Descriptors: *Surface irrigation, *Irrigation efficiency, *Surface runoff, *Recession curves, Furrow irrigation, Border irrigation, Irrigation, Irrigation systems, Irrigation engineering, Irrigation practices, Water storage, Flow.
Identifiers: *Recession flow.

The recession flow of furrow or border irrigation can be expressed as a simple power function which is derived by assuming a linear storage of recession flow. The flow length is expressed as a function of recession time and a constant. The knowledge of the length of recession flow profile and recession time is important in the evaluation of irrigation efficiency, especially in the border irrigation which has a relatively large volume of surface storage at the time when the inflow is shut off. Laboratory experiments were conducted and field data of sugarcane furrow experiments were applied to check the validity of the derived mathematical models. A simple recession flow equation is also derived by considering the recession flow as depleting water from a single shallow linear reservoir. For a relatively short length and small slope of furrow or border, the simple recession flow equation seems to be applicable. (Skogerboe-Colorado State)
W74-05679

THE VALUE OF THE TIDAL MARSH,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 2L.
W74-05782

BOOM IN THE U.S. DESERT--CAN IT KEEP ROLLING.
For primary bibliographic entry see Field 3B.
W74-05792

LITTLE RUNNING WATER DITCH WATERSHED PROTECTION, FLOOD PREVENTION, AND LAND DRAINAGE RC AND D MEASURE PLAN (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4D.
W74-05806

GATHRIGHT LAKE, JACKSON RIVER, JAMES RIVER BASIN, VIRGINIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Norfolk, Va.
Available from National Technical Information Service, Springfield, Va, 22151, as EIS-VA-73-0178-F, $1.45 microfiche. January 19, 1973. 501 p, 14 map, 2 chart, 9 tab, 12 illus.

Descriptors: Environmental effects, *Reservoirs, Surface waters. *Dams, Flooding(Intentional inundation), Backwater, *Flood control, Reservoir fisheries, Recreation, Water pollution, Flood flow, Floodways, Spillways, Water control, Damsites, Dam construction, *Virginia.
Identifiers: *Environmental Impact Statements, *Gathright Lake(Va).

The project is a complete construction of a multipurpose reservoir on the Jackson River, James River Basin, Virginia. A dam will provide a combination flood control, water quality control, area redevelopment, and recreation project within Bath and Allegheny Counties. A cold-water trout habitat will be created in the Jackson River, and a permanent warm-water fishery in the reservoir. About 2,530 acres of land will be permanently inundated removing from effective production all agricultural lands within the Gathright Wildlife Management Area. Approximately 400 people have been relocated. About 12 miles of the Jackson River will be foregone for such things as fishing, canoeing, etc. Wildlife habitats beneficial to turkey and deer production will be reduced. Twenty alternatives were considered. Among them were alternative dam sites, a system of small dams, flood plain zoning, flood insurance, purchase of flood plain, lagooning of pollution wastes, complete removal of pollutants and abandonment of the Gathright project. (Conko-Florida)
W74-05808

BIRCH LAKE, BIRCH CREEK, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
Available from National Technical Information Service, Springfield, Va, 22151, as EIS-OK-72-5319-F, $1.45 microfiche. September 1972. 183, 12 map, 48 tab, 27 chart.

Descriptors: *Environmental effects, *Dams, Surface waters, *Reservoirs, Flooding(Intentional inundation), Dam construction, Fisheries, Water control, Backwater, Water supply, Water storage, Water transfer, *Flood control, Water utilization, Recreation facilities, Wildlife habitats, *Oklahoma.
Identifiers: *Environmental Impact Statements, *Birch Lake(Okla).

This project is located on Birch Creek in Osage County about two miles south of Barnsdall, Oklahoma. It includes the construction of a dam and reservoir for purposes of flood control, water supply, water quality control, recreation, and fish and wildlife habitat preservation. The lake will significantly reduce annual flood damage and will provide a high quality water supply for the area. Low flow augmentation will enhance the downstream environmental setting by providing a more constant and stable flow of good quality water. The lake will provide an excellent recreational resource situated in scenic surroundings, readily available to large and growing urban areas. The lake will result in increased fishery but about 1,137 acres of wildlife habitat will be lost. Some oil recovery operations will be affected as well as county roads, pipelines, utility lines, and about 25 graves will have to be relocated. Possible alternatives included diversion of floodwaters, flood protection by levees, channel enlargement, development of Birch Creek as a recreational stream, and no action. (Conko-Florida)
W74-05809

NEW MELONES LAKE, STANISLAUS RIVER, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Sacramento, Calif.
Available from National Technical Information Service, Springfield, Va, 22151, as EIS-CA-72-4903-F, $15.75 paper copy, $1.45 microfiche. July 1972. 274 p, 25 chart, 8 map, 8 photo.

Descriptors: Environmental effects, *Reservoirs, Surface waters, *Dams, Flooding(Intentional inundating), Dam construction, Damsites, Water control, Backwater, *Flood control, Water utilization, Water supply, Water storage, Water transfer, Hydroelectric power, *California, Wildlife, Recreation.
Identifiers: *Environmental Impact Statements, *New Melones Lake(Cal).

This project consists of a dam across the Stanislaus River at New Melones Lake, California, to impound up to 2,400,000 acre-feet of water. The river below the dam will be maintained at a capacity of 8,000 cubic feet per second and provide for the protection of fish and wildlife resources. Flood protection will be provided for existing and potential agricultural lands and suburban areas of several communities. Other project benefits include general recreation, conservation yield, hydroelectric power generation, water quality control flows, and fish and wildlife. About 10,700 acres of land, much of which is used by wildlife, will be inundated along with 16 miles of river including the existing Melones Dam. The portion of the river that is presently used by whitewater boating enthusiasts will be inundated. There will be an overall net loss in wildlife population and a number of caves and archeological sites will be inundated. Project benefits will induce development in the region resulting in further loss of natural resources. Other alternatives considered were a smaller reservoir, reservoir at a different site, channel and levee improvement, flood plain management, and no action. (Conko-Florida)
W74-05810

HAVASU INTAKE CHANNEL, HAVASU PUMPING PLANT AND BUCKSKIN MOUNTAINS TUNNEL, ARIZONA-NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 8C.
W74-05812

AUGMENTING WATER SUPPLIES OF THE VOLGA RIVER AND DIVERTING PART OF THE RUNOFF OF NORTHERN RIVERS SOUTHWARD (O POVYSHENII VODOOBESPECHENNOSTI R. VOLGI I PEREBROSKE CHASTI STOKA SEVERNYKH REK NA YUG),
For primary bibliographic entry see Field 3B.
W74-05836

COMPLEX USE OF VOLGA WATER RESOURCES (KOMPLEKSNOYE ISPOL'ZOVANIYE VODNYKH RESURSOV VOLGI),
For primary bibliographic entry see Field 3F.
W74-05837

MODELS OF SPRING RUNOFF FORMATION AND PROBLEMS IN THEIR USE FOR FORECASTING THE FLOOD HYDROGRAPH,
Gidrometerologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2A.
W74-05842

ENGINEERING AND GEOGRAPHICAL PROBLEMS IN THE DESIGN AND OPERATION OF LARGE LOWLAND RESERVOIRS (INZHENERNO-GEOGRAFICHESKIYE PROBLEMY PROYEKTIROVANIYA I EKSPLUATATSII KRUPNYKH RAVNINNYKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Geografii.
Izdatel'stvo 'Nauka', Moscow, Vendrov, S.L., editor, 1972. 240 p.

Descriptors: Reservoirs, *Reservoir design, *Reservoir operation, *Regulation, *Shores, Shore protection, Backwater, Water levels, Reservoir silting, Bottom sediments, Beds, Navigation, Shoals, Shallow water, Meteorology, Ice, Soils, Vegetation, Forests, *Forecasting.
Identifiers: *USSR.

Various aspects of the influence of large lowland reservoirs of the USSR on shorelines and adjacent areas are examined. Special attention is given to procedures for forcasting changes in natural conditions in the zone of influence of the reservoirs and to practical recommendations for improving reservoir systems. (Josefson-USGS)
W74-05845

FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2E.
W74-05849

THE ESTIMATION OF FLOOD FLOWS FROM NATURAL CATCHMENTS,
Transport and Road Research Lab., Crowthorne (England).
C. P. Young, and J. Prudhoe.
Available from NTIS, Springfield, Va 22151 PB-223 110; Printed copy $5.50 printed copy; $1.45 microfiche. Report LR-565, 1973. 63 p, 27 fig, 5 plate, 5 tab, 14 ref, 2 append.

Descriptors: *Peak discharge, *Rainfall-runoff relationships, *Runoff forecasting, Streamflow forecasting, Storm runoff, Flood forecasting.
Identifiers: Road Research Laboratory method.

A method of estimating floodflows from natural catchments at desired return periods is based on rainfall and runoff data recorded on a continual basis for several years at natural catchments adjacent to motorways. A statistical analysis of the rainfall and streamflow data was used to determine the significant factors in an equation relating a time of concentration to catchment features. Peak rates of flow may then be calculated using the Bilham rainfall formula, the average annual rainfall fo the catchment, and the catchment area. The method is based on data from natural catchments with an underlying stratum of clay or boulder clay and, when tested on similar gaged catchments, gives reasonable agreement between the calculated and observed flows. The method is primarily for the calculation of peak rates of flow and is not intended for the determination of complete hydrographs. (Knapp-USGS)
W74-05850

LONG-DISTANCE TELEMETRY OF DATA FOR FLOOD FORECASTING,
Institute of Hydrology, Wallingford (England).
I. C. Strangeways, and L. Lisoni.
Nature and Resources, Vol 9, No 4, p 18-21, October-December 1973. 2 fig.

Descriptors: *Flood forecasting, *Telemetry, *Warning systems, Water levels, Floods, Data transmission.
Identifiers: *Brazil.

Telemetry methods are used in forecasting of floods in the Pantanal region of Brazil. The system is an easily maintained, reliable and comparatively low-cost radio telemetry system capable of transmitting measurements of river level and rainfall over large distances in areas difficult of access. It will permit forecasts of the level of the Paraguay River to be made, and is well suited to use in similar large undeveloped areas. (Knapp-USGS)
W74-05859

NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM, FORECAST PROCEDURES.
National Weather Service, Silver Spring, Md.
Available from NTIS, Springfield, Va. 22151 as COM-73-10517. Price $3.00 printed copy; $1.45 microfiche. NOAA Hydrologic Research Laboratory Technical Memorandum NWS HYDRO-14, December 1972. 252 p, 21 fig, 8 tab, 10 ref, 9 append.

Descriptors: *Streamflow forecasting, *River forecasting, *Model studies, *Digital computers, *Computer programs, Systems analysis, Input-output analysis, Hydrologic data, River basins, Methodology, Runoff forecasting, Weather forecasting, Hydrology.

The National Weather Service River Forecast System (NWSRFS) consists of several components such as data acquisition, forecast procedures, and forecast dissemination. This report describes a complete river forecast procedure and purposes: (a) a guide for implementation of conceptual river forecasting models by field offices, (b) a tool for use in testing and evaluating new concepts and procedures by the Hydrologic Research Laboratory (HRL), Silver Spring, Maryland, and (c) a vehicle for providing the results to others in the hydrologic community. Described are the techniques and programs needed for developing operational river forecasts based on the use of a continuous conceptual model, from the initial processing of basin data to the preparation of forecasts. The programs are written for a large-capacity digital computer and are generalized for use on any river system. Thus, they may or may not be the most efficient programs for use in a particular situation. (Woodard-USGS)
W74-05861

FLOOD PLAIN INFORMATION-BACK CREEK IN ROANOKE COUNTY, VIRGINIA.
Army Engineer District, Wilmington, N.C.
Prepared for Fifth Planning District Commission, May, 1972. 24 p, 12 figs, 16 pl, 5 tab.

Descriptors: Floods, Flooding, *Flood data, *Flood forecasting, *Flood plains, *Virginia, Flood control, Flow characteristics, Flood frequency, Flood recurrence interval, Maximum probable flood, Land use, River flow.
Identifiers: *Roanoke County(Virginia), *Back Creek floodplain(Virginia), Intermediate Regional Flood(IRF), Standard Project Flood(SPF), Flood Plain Management(FPM).

The Back Creek floodplain, approximately 3 miles south of the City of Roanoke, is largely undeveloped. The Back Creek Basin is about 17 miles long with an average width of 3.5 miles. It appears future development will include residences and small businesses. Agricultural development, some residences, small businesses, and an auto raceway now exist. This report is intended as an aid in future land-use planning and for management decisions concerning plain utilization. Floods usually occur in the summer, fall, and winter, appearing quickly and with short duration. Most of the 35 bridges and culverts crossing the streams will be obstructive to floodflows. The City of Roanoke has placed some restrictions upon development in flood plain areas with agricultural facilities, public recreational areas, horse academies and stables being permitted. No flood control projects exist or are authorized for the study area or upstream in the watershed. Floods occurred in 1948 and 1959, with floods of greater magnitude predicted since larger floods occurred in the past on streams in the same geographic region and with similar physiographical characteristics. Back Creek areas inundated by an Intermediate Regional Flood would include residences, businesses, and public utilities near Starkey, with more severe problems in a Standard Project Flood. Most of the 35 area bridges are high enough to escape inundation. In an Intermediate Project Flood, water velocity would be 7-20 feet/second, causing streambank and bridge abutment erosion; slightly higher velocities would accompany a Standard Project Flood. (Grden-North Carolina)
W74-05866

FLOOD PLAIN INFORMATION: NEUSE RIVER-ADKIN BRANCH, CITY OF KINSTON, NORTH CAROLINA.
Army Engineer District, Wilmington, N.C.
April, 1972. 34 p, 10 fig, 15 pl, 6 tab.

Descriptors: Floods, Flooding, *Flood data, *Flood forecasting, *Flood plains, *North Carolina, Flood control, Flow characteristics, Flood frequency, Flood recurrence interval, Maximum probable flood, Flood damage, River flow, Floodwater.
Identifiers: *Kinston(N.C.), *Neuse River(N.C.), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Located on the Neuse River, Kinston is becoming an important eastern N.C. manufacturing and commercial center. The Neuse floodplain is broad and partially developed, with 40% of the land woodland and 25% agricultural land. Pressure exists to develop land adjacent to highways in the floodplain for commercial and industrial use. Major floods occur during all seasons, with the worst flood occurring in July, 1919. Under existing conditions future flood flow would cover a large part of Kinston. Quantities of floatable material stored on floodplain lands may be carried downstream causing severe damage to structures and clogging openings of bridges and culverts. During an Intermediate Regional Flood water velocity would reach 5 ft./second causing streambank erosion; slightly higher velocities would occur for a Standard Project Flood. Floodwaters rise slowly and remain high for long periods. No

city or county regulatory measures specifically for the reduction of flood damage exist. Channel improvements along Adkin Branch which has a highly developed floodplain are expected to provide maximum protection from flooding from local runoff but will not materially reduce flood stages in the stream created by Neuse River floods. Construction of the Falls Lake project, a multi-purpose reservoir, to be located about 145 miles upstream from Kinston on the Neuse River is scheduled for completion in December, 1975. By controlling about 28% of the drainage area above Kinston, this project should have a regulating effect on the Neuse River at Kinston of about 2 1/2 feet depending upon the magnitude of flood events. (Grden-North Carolina)
W74-05867

FLOOD PLAIN INFORMATION - NEUSE RIVER, STONEY CREEK, AND LITTLE RIVER, GOLDSBORO, NORTH CAROLINA.
Army Engineer District, Wilmington, N.C.
February, 1972. 19 p, 24 pl, 9 tab.

Descriptors: Floods, Flooding, *Flood data, *Flood forecasting, *Flood plains, *North Carolina, Flood control, Flow characteristics, Flood frequency, Maximum probable flood.
Identifiers: *Goldsboro(North Carolina), *Neuse River(N.C.), Stoney Creek(N.C.), Little River(N.C.), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Goldsboro is one of the largest cities serving the Coastal Plains agricultural area of North Carolina. Neuse River and its tributaries, Stoney Creek and Little River flow southward and drain a fairly large portion of the city. Flood plain development includes residential, commercial, and industrial development, with railroads, utility lines, sewage treatment facilities, and a hospital. Continuing urban expansion is expected into the flood plains. A city zoning ordinance restricts the use of a portion of Stoney Creek's flood plain but there are no ordinances for the other flood plains in or near Goldsboro. This study was requested to serve as a basis for development of flood plain management measures. Most flooding occurs in the spring and early fall, with flood flow obstruction created by 15 bridges and culverts and agricultural implements stored outside in the flood plain. Considerable damage to commercial, industrial and residential sections and to public and private utilities would occur during an Intermediate Regional Flood with maximum velocities that would occur in the main channel of the streams described ranging from 5.4 ft. per sec. to 5.9 ft. per sec. Low overflow banks would result in deposits of silt and debris, especially around bridges. A Standard Project Flood would create more severe damage because of higher velocities with channel flow, ranging from 6.5 ft. per sec. to 8.8 ft. per sec., wider extent, and greater depths of flooding. (Grden-North Carolina)
W74-05868

THE LAND WATER INTERFACE IN AN URBAN REGION: A SPATIAL AND TEMPORAL ANALYSIS OF THE NATURE AND SIGNIFICANCES OF CONFLICTS BETWEEN COASTAL USES,
Washington Univ., Seattle. Div. of Marine Resources.
For primary bibliographic entry see Field 6B.
W74-05872

MANAGEMENT OF STORM DRAINAGE AND FLOOD CONTROL ACTIVITIES.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 5D.
W74-05878

PLANNING MANUAL FOR STORM DRAINAGE AND FLOOD CONTROL.
Denver Regional Council of Governments, Colo.
For primary bibliographic entry see Field 5D.
W74-05879

FEASIBILITY OF COMBINED SOLID WASTE AND STORM DRAINAGE PROJECTS.
Denver Regional Council of Governments, Colo.
Available from the National Technical Information Service as PB-224 108; $4.25 in paper copy, $1.45 in microfiche. Project REUSE Final Report (Supplement), June, 1972. 42 p, 2 tab, 11 fig. HUD COLO-USE-1. DHUD-H-1392.

Descriptors: *Feasability studies, *Waste disposal, *Storm drains, *Multiple-purpose projects, *Landfills, *Colorado, Solid wastes, Water, Water pollution, Water quality, Urban drainage, Reservoirs, Flood plain, Flood control, Runoff, Sanitary engineering.
Identifiers: *Denver(Colorado), Gravel pits, Project REUSE, Detention ponds, Solid waste management, Sanitary landfills.

Project REUSE demonstrates the feasibility of detention ponding adjacent to a sanitary landfill site, using abandoned gravel pits, to combine urban drainage and flood control with solid waste management in Denver, Colorado. Constraints for the region include use of gravel pits, location in a flood plain, and local hydrological factors. Three approcahes developed include on-stream detention ponds upstream of dikes formed by solid waste landfill, use of landfill to fill existing gravel pits for land reclamation, and use of abandoned gravel pits to provide detention storage. Sites were evaluated, and the Littleton Recreation Area was selected for the first approach. Results show problems with water pollution and economic feasibility due to small scale. Further research is needed, including developing dike-top flood erosion protection and more effective plastic and butyl rubber lines for landfill isolation, to make these approaches feasible. Sanitary landfill minimizes detrimental effects incurred by urban systems, and detention ponds reduce flood damage by controlling runoff. Synergistic benefits could occur in a multi-purpose project, including landforms built of landfilled material, increased environmental protection and economy, and reservoirs constructed over landfills. (Grden - North Carolina)
W74-05880

THE PHYSICAL SETTING OF THE COLORADO RIVER BASIN,
California State Water Resources Control Board, Sacramento.
W. D. Maughan.
American Association for the Advancement of Science 140th Paper presented at meeting, San Francisco, Feb. 1974. 16 p, 11 ref.

Descriptors: River basins, *Mexican Water Treaty, *Interstate rivers, *River basin development, *Salinity, *Colorado River basin, Colorado River Compact, Rocky Mountain Regions, Rivers, Arizona, California, Colorado, Water resources development, River systems, Water quality, Water pollution, Return flow, Irrigation, Geologic history, Geomorphology, Erosion.

Physical and historical aspects of the Colorado River Basin are described. The topography of the Basin is presented, with emphasis on the tributaries and on the Colorado River itself. A detailed geologic and morphologic history of the basin describes the origin of the erosional features for which the region is so famed. Mineral resources of the area are judged significant in crude oil, oil shale, coal, copper, uranium, molybdenum, trona and limestone. These resources acquire additional importance in light of the present energy crisis. Short descriptions of land resource utilization, water supply, and population are presented. The water quality problem of the Colorado River is discussed from a historical point of view. The changes of water quality along the river are described. The extensive water resources development along the Colorado is discussed in relation to the water quality of the river system. (Muller-Arizona)
W74-05921

DEMANDS ON NATIONAL FORESTS REQUIRE COORDINATED PLANNING,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
P. F. O'Connell, and R. S. Boster.
Arizona Review, Vol 23, No 2, p 1-7, February 1974. 3 fig, 1 tab, 12 ref.

Descriptors: *Forests, *Forest management, *Forest watersheds, *National forests, *Demands, Lumbering, Trees, Land use, Natural resources, Water resources, Water policy, Land resources, Land management, Recreation, Regional economics, *Arizona, Water costs, Water management(Applied).

An ever-increasing number of often conflicting demands are being placed on the National Forests of the United States. The resource policy of the Forest Service must change in correspondence with these changing demands. Economic values must now be considered in such policy. The 10,000-acre study area north of the Mogollon Rim in Arizona is used to illustrate this consideration. In this area, timber, range water and recreation compete for the use of the forest. About two-thirds of the runoff goes into the Little Colorado while one-third enters the Salt and Verde Rivers. The increment of this water is calculated with respect to downstream users and compared to the incremental values of the competing demands. The price for these demands is compared to the ability to pay for the demand and this bracket is used to identify the marginal value of the demand which is used in the economic decision making process in forest management policy. (Muller-Arizona)
W74-05926

INTERREGIONAL PLANNING OF WATER RESOURCES ALLOCATIONS BY SYSTEMS ANALYSIS APPROACH,
Utah Water Research Lab., Logan.
J. E. Keith, J. C. Anderson, A. B. King, M. H. Anderson, and T. C. Anderson.
A Summary Report, PRWG 100-5, July 1973. 41 p, 14 fig, 14 tab, 65 ref, append.

Descriptors: *Water supply development, *Utah, *Water allocation(Policy), *Water demand, *Water delivery, *Water utilization, *Economic efficiency, Linear programming, Optimization, Planning, Costs, Constraints, Methodology, Marginal costs, Systems analysis, Mathematical models.

Water allocation in Utah involves considering: (1) the allocation of water itself; and (2) the allocation of water-related resources necessary to distribute the water, both of these requiring relatively large investments of public funds. The availability of and demand for water were studied using a systems approach. A supply and demand model was used to determine efficient (optimal) allocations; since the problem is highly complex, mathematical programming techniques using computer technology were utilized, enabling the generation of optimum values for the variables as well as shadow prices which represent marginal cost or value of those variables. The general objective was to develop a methodology for determining optimal allocations of water in Utah, given alternative assumptions and constraints. The approach was to structure a statewide model of water use and delivery in a linear programming framework, explicitly including the water supply system, various water demands, and alternative water salvage, reuse, and transfers under consideration by water planners. Optimal solutions to the statewide programming model were based upon maximizing net economic returns to water use in the state, given

the alternative assumptions, and were therefore the economically efficient allocations of Utah's water supplies. Given the determination of the efficient allocations over the projected time frame, the economic costs of prematurely investing in transfer facilities or of limiting the use of low-cost water sources were estimated using losses in producers' and consumers' surplus. (Bell-Cornell)
W74-05932

OPTIMUM RESERVOIR OPERATING POLICIES AND THE IMPOSITION OF A RELIABILITY CONSTRAINT,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
A. J. Askew.
Water Resources Research, Vol 10, No 1, p 51-56, February 1974. 1 fig, 4 tab, 13 ref.

Descriptors: *Reservoir operation, *Dynamic programming, *Simulation analysis, Economics, Methodology, *Probability, *Failures, *Stochastic processes, Water supply, Reservoir releases, *Optimization, Mathematical models, Systems analysis.
Identifiers: Operating policy, Benefit maximization.

Stochastic dynamic programming provides a very efficient means of deriving optimum operating policies that maximize the expected net dollar benefits for a water resource system. These policies may give rise to significant probabilities of system failure. Such probabilities can be estimated by system simulation. An iterative procedure is proposed in which the combined use of dynamic programming and simulation allows an optimum operating policy to be derived that will maximize the expected net benefit and at the same time will restrict the probability of failure to an acceptable level. Limitations to failure are applied directly by imposing a fixed penalty on the system whenever it fails, thus inducing amendments in the optimum policies derived. Further developments of the technique are foreshadowed. (Bell-Cornell)
W74-05934

OPTIMAL DESIGN AND OPERATION OF WATER DISTRIBUTION SYSTEMS,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
U. Shamir.
Water Resources Research, Vol 10, No 1, p 27-36, February 1974. 1 fig, 2 tab, 31 ref.

Descriptors: *Water distribution(Applied), *Design, *Operation and maintenance, *Methodology, Economics, Constraints, Performance, Physical properties, Optimization, Pipes, Flow, Reservoirs, Water levels, Hydraulics, Costs, Computer programs, Mathematical models, Systems analysis, Equation.
Identifiers: *Looped networks, *Newton-Raphson method, Operating policy, Sensitivity, Analysis.

A methodology is developed for optimal design and/or operation of a water distribution system that is to operate under one or several loading conditions. Decision variables may be design variables, such as pipe diameters, or control variables, such as heads and flows. The general formulation considers the cost of the design and the cost of operating the system. The objective function may include the initial cost of the design, the cost of operation, the physical measures of performance, and the penalties for violating constraints. Constraints may be imposed on the decision variables and on the performance of the system under each loading. The model for the flow problem is based on node equations. Flow solutions are obtained by a modified Newton-Raphson method employing sparse matrix techniques. Optimization is obtained by a combination of the generalized reduced gradient and penalty methods. Implementation in a computer program and its use on a test problem in both batch and time-sharing modes are described, and it is concluded that the method is computationally feasible. The many different ways in which it can be used to analyze, design, and operate water distribution systems are outlined. (Bell-Cornell)
W74-05937

MODELING THE REGULATION OF LAKE SUPERIOR UNDER UNCERTAINTY OF FUTURE WATER SUPPLIES,
Sun Oil Co., Dallas, Tex.
S. Y. Su, and R. A. Deininger.
Water Resources Research, Vol 10, No 1, p 11-25, February 1974. 13 fig, 7 tab, 11 ref, 3 append.

Descriptors: *Lake Superior, *Regulation, *Water levels, *Markov processes, *Water supply, *Stochastic processes, Optimization, Algorithms, Inflow, Mathematical models, Systems analysis, *Risks.
Identifiers: Operating policy, Economic loss functions, Data, Sensitivity analysis.

The regulation of the water levels of Lake Superior, via control at its outlet, has been considered. A general one-lake system is described, for which an optimization model is then developed, and a method for finding an optimal operating policy is introduced. The inflows to the lake are treated as stochastic random variables. The objective was to find operating policies that minimized the expected undiscounted yearly losses over an infinite time horizon. The system was modeled as a periodic Markovian decision problem. A new algorithm based on White's method of successive approximations for solving single chained and completely ergodic Markovian decision problems was developed and proven to be fairly efficient in terms of computer storage and computation time. Transition probabilities of the inflows were estimated from 64 years of data. The economic loss functions used in the model considered the losses due to navigation inconvenience and shore property damage. An extensive sensitivity analysis was conducted to determine their influence on the optimal operating policies. To show the validity of the model, the newly developed policies were tested against the current operating policy by using the historical inflow record as data. The results show that if some of the developed operating policies were adopted, the average yearly losses could be reduced by at least 15%. Concurrently, monthly lake level variances could be reduced by 25%. (Bell-Cornell)
W74-05938

ECOLOGICAL AND PHYSIOLOGICAL PRINCIPLES OF PROTECTIVE AFFORESTATION IN SEMIDESERTS, (IN RUSSIAN),
S. Ya. Kraevoi.
Nauka: Moscow. 1970. 240p. Illus.
Identifiers: Animals, Deserts, Drought, *Ecological studies, *Forestation, Growth, Physiological studies, Salt, Soils, Trees, *USSR, Vegetation, *Semi-arid lands.

Protective afforestation trials on light-chestnut soils of solonetzic complex are described. The effectiveness of the growth of trees in relation to soil conditions and other environmental factors is discussed. The following topics are covered: the history of afforestation in the Ergenyakh area, Yakutsk, ASSR, USSR; climatic peculiarities of the area; soils, vegetation and animals of the Arshan-Zel'men' Station of the Laboratory of Forestry of the Academy of Sciences of the USSR; water regimen of trees and of light-chestnut and solonetzic soils under the protective forest stands in the central Ergenyakh area; dependence of tree growth and development on ecological conditions; salt and drought resistance; and scientific principles of the afforestation agricultural technique used in the central Ergenyakh area.--Copyright 1973, Biological Abstracts, Inc.
W74-05945

LARCH PLANTATIONS IN THE FOREST STEPPE ZONE, (IN RUSSIAN),
A. M. Shebalov.
Tr Ural Lesotekh Inst. 21, p 328-33. 1970.
Identifiers: Caragana-arborescens, *Forest steppe zone, *Larch plantations, Larix-sukaczewii, Pine, Plant, Productivity, Sambucus-racemosa, Tilia-cordata, *USSR(Chelyabinsk region).

The introduction in forest plantations in the Chelyabinsk region, USSR, of Larix sukaczewii in condusive to an increase of productivity of the forests. Loamy gray forest and chernozem soils are most suitable for the larch plantations. A mixed stand with a density of 6000-7000 plants/ha consisting of 30-50% L. sukaczewii is preferred. The most successful type of stand is a mixture of L. sukaczewii and pine spearte rows; the larch here exceeds pine in height and diameter growth. Caragana arborescens planted in rows between the rows of larch on dark gray forest soils with a stable water regime is condusive to the growth of larch and pine. Stands with larch and C. arborescens in pure rows have high indexes of height and diameter growth. In stands with closed canopies the process of natural pruning proceeds well. Tilia cordata is promising as an associate tree species, and Sambucus racemosa as an underwood species.--Copyright 1973, Biological Abstracts, Inc.
W74-05946

4B. Groundwater Management

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO: MIDDLE RIO GRANDE REGION,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W74-05408

SUBSURFACE ASPHALT MOISTURE BARRIERS IN SANDY SOILS,
Delaware Univ., Newark. Dept. of Agricultural Engineering.
E. N. Scarborough, and W. C. Liebhardt.
Available from the National Technical Information Service as PB-229 518, $4.00 in paper copy, $1.45 in microfiche. University of Delaware Agricultural Experiment Station Bulletin 401, June 1973. 15 p, 10 fig, 4 tab, 6 ref, append. OWRR A-012-DEL(2).

Descriptors: *Groundwater barriers, *Soil water movement, *Leaching, *Fertilizers, Sands, Water pollution control, Soil-water-plant relationships, Crops, Nitrates.
Identifiers: *Soil water barriers.

A subsurface asphalt moisture barrier as an aid in soil moisture retention and reduction of nitrate leaching in sandy soils was investigated. In field studies with six vegetable crops grown on loamy sand soils, average yield increases of all crops over the barrier were 46%, 58%, and 55% for 1967, 1968, and 1969, respectively. Yield increases were the result of increased water retention of the soil and reduced nitrate leaching from excessive rainfall. In laboratory leaching studies using high rates of nitrogen, the mean nitrate movement was approximately six inches of soil depth per inch of water applied. Approximately 2-1/2 times as much nitrate remained in the top two feet of soil over the barrier compared to when no barrier was used and five inches of water was applied. The asphalt moisture barrier is an effective production tool for growing vegetable crops in sandy soil where irrigation is not feasible, especially under conditions of short periods of drought and occasional heavy rainfalls. (Knapp-USGS)
W74-05412

NEW DIRECTIONS IN U.S. WATER POLICY--SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FROM THE FINAL REPORT OF THE NATIONAL WATER COMMISSION.
National Water Commission, Arlington, Va.
For primary bibliographic entry see Field 6B.
W74-05522

WATER FOR INDUSTRIAL DEVELOPMENT IN CALHOUN, CHICKASAW, CHOCTAW, GRENADA, MONTGOMERY, WEBSTER, AND YALOBUSHA COUNTIES, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 3E.
W74-05525

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS: VOLUME II--RECORDS OF WELLS, 1892-1972,
Geological Survey, Austin, Tex.
R. K. Gabrysch, W. L. Naftel, G. D. McAdoo, and C. W. Bonnet.
Texas Water Development Board Report 178, January 1974. 181 p, 11 fig, 7 ref.

Descriptors: *Data collections, *Hydrologic data, *Texas, *Water wells, Sampling, Water analysis, Water yield, Water levels, Aquifer testing, Land subsidence, Groundwater.
Identifiers: *Harris County(Tex).

The collection of hydrologic data in Harris County, Texas, was begun by the U.S. Geological Survey in 1929. The data-collection program consists of an inventory of new large-capacity and other selected wells, the collection of water samples from wells for chemical analyses, an inventory of groundwater pumpage, water-level measurements in observation wells, pumping tests on large-capacity wells, and a compilation of information on land-surface subsidence. This report presents records of 2,635 wells in 10 areas in Harris County that have been collected as part of the inventory from 1929 to 1972. (See also W74-05528) (Knapp-USGS)
W74-05527

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS: VOLUME III--CHEMICAL ANALYSES OF WATER FROM WELLS, 1922-71,
Geological Survey, Austin, Tex.
R. K. Gabrysch, W. L. Naftel, and G. D. McAdoo.
Texas Water Development Board Report 178, February 1974. 87 p, 1 fig, 5 ref.

Descriptors: *Data collections, *Hydrologic data, *Water quality, *Texas, Sampling, Water chemistry, Water analysis, Silica, Iron, Manganese, Calcium, Magnesium, Sodium, Potassium, Bicarbonates, Sulfates, Chlorides, Fluorides, Nitrates, Phosphates, Hardness(Water), Groundwater, Water wells.
Identifiers: *Harris County(Tex).

The collection of hydrologic data in Harris County, Texas, was begun by the U.S. Geological Survey in 1929. The data-collection program consists of water-level measurements in observation wells, the collection of water samples from wells for chemical analyses, an inventory of groundwater pumpage, an inventory of new large-capacity wells, and pumping tests on new large-capacity wells. This report presents chemical analyses of water from 737 wells for the period 1922-71. (See also W74-05527) (Knapp-USGS)
W74-05528

AVAILABILITY OF GROUND WATER IN THE FEDERAL WAY AREA, KING COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash.
D. R. Cline.
Open-file report, 1969. 60 p, 6 fig, 4 tab, 4 ref, append.

Descriptors: *Groundwater, *Water yield, Hydrogeology, Hydrologic data, Washington, Aquifers, Drawdown, Glacial drift.
Identifiers: King County(Wash).

The availability of large supplies of groundwater was studied in the Federal Way area in southwestern King county. The most productive aquifer in the 31-square-mile area is a deposit of sand and gravel that underlies glacial till in the central part of the area. Most of the wells that tap groundwater in this buried glacial channel will yield more than 500 gpm, and one well produces 2,600 gpm. The wells here have specific capacities of 10 gpm or more per foot of drawdown. Coefficients of transmissibility of the aquifer range from about 200,000 to 600,000 gpd per foot. Annual recharge to the groundwater reservoir in the area is by local precipitation and is estimated to average about 16 inches, or about 8.8 billion gallons. Probably no more than about one-half of this, or 4.4 billion gallons per year, can be withdrawn through wells without causing undesirable effects, such as excessive declines of groundwater levels and of the low flows of streams draining the area. The amount of water pumped in 1967 by Water Districts 64 and 100 was 1.03 billion gallons, an increase of 65% in just 2 years. Much of the water withdrawn probably returns to the groundwater reservoir through percolation from septic tanks and drain fields. (Knapp-USGS)
W74-05545

A SUMMARY ON GROUND WATER IN THE HAN RIVER BASIN, REPUBLIC OF KOREA,
Geological Survey, Reston, Va.
J. T. Callahan, and Il Choi Seung.
Reprint from The Memoirs for Professor Chi Moo Son's Sixtieth Birthday, December 1972. 4p.

Descriptors: *Groundwater resources, *Water wells, *Water quality, *Hydrogeology, *Foreign countries, Water supply, Water utilization, Aquifer characteristics, Pumping, Water yield, Groundwater recharge, Storage capacity, Water resources development, Projections, Reviews.
Identifiers: *Han River basin(Korea), *Republic of Korea.

The Han River basin occupies 26,200 sq km, most of the northern fourth of the Republic of Korea, and extends north of the Demilitarized Zone (DMZ) into North Korea. The basin also includes the Imjin River basin which was not included in this investigation because it is within the DMZ at its confluence with the Han River, and much of its area is military controlled or north of the DMZ. In 1969 groundwater use in the Han River basin was estimated to have been about 330 million cu m, about 17% of the total water requirement. The estimated annual yield of groundwater from the bedrock aquifers is at least 4,000 million cu m, and that of the alluvial sand and gravel deposits is at least 5,000 million cu m. Groundwater in storage in the bedrock and alluvium is estimated to be about 62,000 million cu m. Annual pumpage of about 3% of storage will meet the projected groundwater requirement of the year 2001 (2361 million cu m). On the average groundwater pumped from storage will be recharged annually during the summer rainy season. The chemical quality of groundwater is good for irrigation and municipal use and most industrial uses. Total dissolved solids are usually less than 300 mg/liter. Sewage effluents have caused pollution of many shallow wells in villages. (Woodard-USGS)
W74-05546

GROUNDWATER RECHARGE WITH TREATED WASTEWATER,
Wisconsin State Univ., Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 5D.
W74-05552

BASE OF FRESH GROUND WATER--APPROXIMATELY 3,000 MICROMHOS--IN THE SACRAMENTO VALLEY AND SACREMENTO-SAN JOAQUIN DELTA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W74-05553

THE WATER TABLE ON LONG ISLAND, NEW YORK, IN MARCH 1970,
Geological Survey, Mineola, N. Y.
G. E. Kimmel.
Long Island Water Resources Bulletin No 2, 1971. 8 p, 2 fig, 16 ref.

Descriptors: *Water table, *New York, Groundwater, Water supply, Withdrawal, Hydrologic data.
Identifiers: *Long Island(NY).

A net-change map comparing water-table altitudes in Long Island, N Y in 1951 with those in 1970 shows a maximum rise of about 30 feet in Kings County and a maximum decline of about 30 feet in Queens County during this period. In northern Nassau County, net declines generally ranged from 5 to 20 feet. The net change in the water table in virtually all Suffolk County from 1951 to 1970 was less than 5 feet. (Knapp-USGS)
W74-05556

GROUNDWATER OF PASTURES OF KAZAKHSTAN (PODZEMNYYE VODY PASTBISHCHNYKH TERRITORIY KAZAKHSTANA).
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Gidrogeologii i Gidrofiziki.
For primary bibliographic entry see Field 2F.
W74-05563

ROLE OF MODELS IN GROUNDWATER MANAGEMENT,
California State Dept. of Water Resources, Sacramento.
E. M. Weber, and A. A. Hassan.
Water Resources Bulletin, Vol 8, No 1, p 198-206, February, 1972. 3 fig, 1 tab.

Descriptors: *Water management(Applied), *Surface-groundwater relationships, *Water resources development, *Computer models, Mathematical models, Groundwater resources, Water utilization, Groundwater potential, Aquifer management, Groundwater movement, Surface water, *Forecasting.

To integrate operation of ground and surface water supplies into their management plans, decision-makers must be able to predict the effects of various alternative modes of operation and meteorological conditions on the groundwater basin. Many types of models have been used for simulating the behavior of groundwater basins under these changes. Analog simulators, analog computers, and digital computers have been employed for model development. To achieve plausible models, detailed hydraulic and hydrologic characteristics are required, such as data on transmissivity, storage, and net deep percolation. These data are used in the equations that form the model. Water quality, which cannot be separated from quantity, deserves equal consideration. Recently, considerable efforts have been made to develop water quality prediction tools through the use of modeling techniques. (Skogerboe-Colorado State)
W74-05680

WATER-MANAGEMENT PROBLEMS RELATED TO GROUNDWATER RIGHTS IN THE SOUTHWEST,
Geological Survey, Menlo Park, Calif.
H. E. Thomas.
Water Resources Bulletin, Vol 8, No 1, p 110-117, February, 1972. 27 ref.

Descriptors: *Water law, *Water rights, *Groundwater, Conjuntive use, Groundwater availability, Groundwater resources, Water supply, Water utilization, Texas, New Mexico, Arizona, California, *Southwest U.S., *Prior appropriation.

The systems of underground water rights for the states of Texas, Arizona, New Mexico and California are summarized. (Skogerboe-Colorado State)
W74-05683

A PROGRESS REPORT ON RESULTS OF TEST-DRILLING AND GROUND-WATER INVESTIGATIONS OF THE SNAKE PLAIN AQUIFER, SOUTHEASTERN IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 2F.
W74-05715

GROUND WATER IN THE KANSAS RIVER VALLEY, JUNCTION CITY TO KANSAS CITY, KANSAS,
Geological Survey, Lawrence, Kans.
S. W. Fader.
Kansas Geological Survey, Lawrence, Bulletin 206, Part 2, January 1974. 12 p, 7 fig, 2 plate, 5 tab, 29 ref.

Descriptors: *Hydrogeology, Kansas, *Alluvial channels, *Groundwater, Conjunctive use, Induced infiltration, Aquifer characteristics, Aquifer testing, Water yield, Transmissivity.
Identifiers: *Kansas River Valley(Kan).

The combined river and alluvial-aquifer systems are the principal source of water for municipal, industrial, and irrigation supplies along the Kansas River valley in northeast Kansas. The depth to water in the valley-fill deposits ranges from 0 to 50 feet below land surface and averages about 25 feet. The valley-fill deposits contained about 1 million acre-feet of groundwater in storage in 1967. Wells yielding more than 1,000 gallons per minute are common. Transmissivity ranges from 5,300 to 48,000 square feet per day and the long-term storage coefficient was estimated to average 0.15. The chemical quality of the groundwater is suitable for most uses; however, the water is generally very hard and may contain as much as 58 milligrams per liter of total iron. (Knapp-USGS)
W74-05848

SINKHOLE PROBLEM ALONG PROPOSED ROUTE OF INTERSTATE HIGHWAY 459, NEAR GREENWOOD, ALABAMA,
Geological Survey, University, Ala.
For primary bibliographic entry see Field 2F.
W74-05857

WATER RESOURCES DATA FOR NEW YORK, 1972: PART 2. WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 2E.
W74-05931

4C. Effects On Water Of Man'S Non-Water Activities

EVAPORATION, INFILTRATION AND RAINFALL-RUNOFF PROCESSES IN URBAN WATERSHEDS,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-05405

EFFECTS OF URBANIZATION ON STREAM CHANNELS AND STREAM FLOW,
Regional Science Research Inst., Philadelphia, Pa.
T. R. Hammer.
Available from the National Technical Information Service as PB-229 836; $17.50 in paper copy, $1.45 in microfiche. Completion Report, November 1973. 272 p, 31 fig, 42 tab, 15 ref. OWRR C-2174(3.

Descriptors: *Channel improvement, *Planning, Runoff, *Land use, *Urbanization, Sedimentation, *Streamflow, *Flood frequency, Pennsylvania, Maryland, District of Columbia, *Forecasting.
Identifiers: Channel enlargement.

Empirical relationships are derived (1) between types of locations and amounts of urban land use and channel enlargement as compared with natural channel size, (2) between channel enlargement and stream flow, and (3) between extent of urbanization and floods of different frequencies. Highly significant relationships were found, based on large numbers of observations. The relationships are applied for purposes of prediction of hydrologic impacts and land use planning. The process of channel enlargement and channel configuration change is studied through permanent measuring stations on five gaged urban streams.
W74-05534

A FACTOR ANALYSIS OF SELECTED WATER QUALITY VARIABLES IN CENTRAL NEW JERSEY DURING 1960-1969,
Rutgers-The State Univ., New Brunswick, N.J. Dept. of Geography.
For primary bibliographic entry see Field 5B.
W74-05716

URBAN FLOOD FREQUENCY CHARACTERISTICS,
Espey, Huston and Associates, Inc., Austin, Tex.
For primary bibliographic entry see Field 2E.
W74-05738

ADD SALT TO TASTE,
Habitat, Inc., Belmont, Mass.
For primary bibliographic entry see Field 5B.
W74-05795

MASTER PLANNING METHODOLOGY FOR URBAN DRAINAGE,
Rice (Leonard) Consulting Water Engineers, Denver, Colo.
For primary bibliographic entry see Field 6A.
W74-05834

LAKE NORMAN DEVELOPMENTAL IMPACT STUDY,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 6B.
W74-05869

4D. Watershed Protection

SIMULATION OF THE HYDROLOGY OF UNGAGED WATERSHEDS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W74-05403

WATERSHED MODELS: TOOLS IN PLANNING LAND MANAGEMENT FOR WATER AND POLLUTION CONTROL,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 2A.
W74-05570

LITTLE RUNNING WATER DITCH WATERSHED PROTECTION, FLOOD PREVENTION, AND LAND DRAINAGE RC AND D MEASURE PLAN (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
Available from National Technical Information Service, Springfield, Va, 22151, as EIS-AR-73-0867-F, for $4.75 paper copy, $1.45 microfiche. May 11, 1973. 48 p, 1 map, 6 tab.

Descriptors: *Watershed management, *Flood protection, *Arkansas, *Surface drainage, Land management, Conservation, Channels, Ditches, Watersheds, Flood damage, Runoff, Sheet erosion, Sedimentation, Flood plains, Canals, Drainage, Drainage engineering.
Identifiers: *Environmental impact statements, Randolph County, Ark.

The Ozark Foothills Resource Conservation and Development Project is located in Randolph County, Arkansas. The project is for watershed protection, flood prevention, and land drainage. These goals will be achieved by applying land treatment measures and constructing 41 miles of channel work with appurtenant structures. Land treatment measures are expected to effectively reduce runoff and sheet erosion rates. Flood damages will be reduced. Sedimentation downstream will be increased during contruction. Ditch bank erosion will be insignificant after revegetation. Agricultural efficiency will be greately increased and the economy and rural development of the area will be generally improved. The plant cover and wildlife habitat will be temporarily destroyed on one side of the ditches and the ditch fishery will be destroyed during construction. Ditch enlargement will take forty-seven acres of agricultural land. Some accelerated clearing of the 286 acres of forest land outside the Black River flood plain may take place. (Sears-Florida)
W74-05806

BEACH EROSION CONTROL PROJECT, DELRAY BEACH, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 8A.
W74-05813

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

INVESTIGATIONS OF FRESHWATER SURFACE MICROLAYERS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
R. F. Hatcher, and B. C. Parker.
Available from the National Technical Information Service as PB-229 679, $4.00 in paper copy, $1.45 in microfiche. Virginia Water Resources Research Center Bulletin 64, 1974. 84 p, 6 fig, 43 tab, 30 ref. OWRR A-037-VA(6).

Descriptors: Microbiology, Algae, Fungi, Bacteria, Coliforms, Seston, *Sampling, *Monitoring, *Pollutant identification, Surfaces, *Water sampling.
Identifiers: Surface slicks, *Surface microlayers.

Four surface microlayer sampling devices were compared. The objective of this comparison was to determine relative sampling efficiencies and depths in which water was collected by each sampler. The results showed that the plate and drum samplers were far superior to the screen and tray samplers in sampling efficiency and in collecting a thin surface microlayer. Also several parameters of freshwater surface microlayers were compared to those of water from a 10-cm depth in three

aquatic environments. The results showed that surface microlayers were often microbiologically and chemically enriched, compared to the subsurface water. The freshwater surface microlayers may have major roles in the recycling of nutrients, incorporation of toxicants into food chains, and the creation of aerosols containing coliform and pathogenic bacteria. Furthermore, the study of surface microlayers offers a sensitive technique of monitoring aquatic environments for certain pollutants such as coliform bacteria, heavy metals, and many pesticides.
W74-05410

WATER QUALITY CRITERIA, SECOND EDITION.
California State Water Resources Control Board, Sacramento.
Publication 3-A, Revised 1963. 548 p, 4 fig, 33 tab, 3,827 ref. Edited by J. E. McKee and H. W. Wolf.

Descriptors: *Water quality standards, *Reviews, *Bibliographies, State governments, Interstate, Legal aspects, Legislation, *Beneficial use, Pollutants, *Radioactivity, *Pesticides, *Toxicity, *Lethal limit, *Water quality control, Water pollution.
Identifiers: Surface active agents.

This January 1973 reprint report serves as a compendium of current literature on the subject of water-quality criteria, and attempts to present the material in a manner that will be most useful to the water-pollution-control boards and their staffs. For this purpose, the report has been cross-referenced extensively. The bulk of the report consists of summaries of literature relating to threshold and limiting concentrations for each potential pollutant with respect to each beneficial use of the water. Each substance or waste that may enter the waters of the State is deemed to be a 'potential' pollutant--potential in the sense that, if concentrated sufficiently, it can adversely and unreasonably affect such waters for one or more beneficial uses; and yet, if diluted adequately, it will be harmless to all beneficial uses. Chapters include: Water Quality Criteria Promulgated by State and Interstate Agencies; Judicial Expression; Quality Criteria for the Major Beneficial Uses of Water; Potential Pollutants; Biological Pollutants; Radioactivity; Pesticides; and Surface Active Agents. (OWRR)
W74-05417

OCCURRENCE, RADIOACTIVITY, AND DIVERSITY, OF WINNIPEG RIVER BENTHIC ORGANISMS IN THE VICINITY OF WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
For primary bibliographic entry see Field 5C.
W74-05418

ENVIRONMENTAL RADIATION SURVEILLANCE OF THE OYSTER CREEK NUCLEAR GENERATING STATION.
New Jersey Dept. of Environmental Protection, Trenton. Div. of Environmental Quality.
Report, July 1973. 121 p, 2 fig, 40 tab, 16 ref. EPA 68-01-0527.

Descriptors: *Survey, *Assay, *Measurement, *Radioactivity, *New Jersey, Nuclear powerplant, Effluents, Cooling water, Bays, Water pollution, Radioisotopes, Air pollution, Fallout.
Identifiers: *Barnegat Bay(N.J.).

New Jersey has maintained an environmental surveillance program for the Oyster Creek Nuclear Generating Station owned by the Jersey Central Power and Light Company since 1965. During 1971 the State initiated a comprehensive environmental study of the plant characterizing the distribution of facility-oriented radionuclides in the various biological and physical components of Barnegat Bay. In April of 1972, the State entered into contract with the U.S. Environmental Protection Agency to provide offsite environmental radiation surveillance data relative to the Oyster Creek facility. Scientific equipment was obtained in order to enable the State to evaluate many of the radiological aspects which were not evaluated in 1971. A summarization is presented of the data and the endeavors of the Bureau of Radiation Protection during the past year. (Houser-ORNL)
W74-05430

CONVERSION OF SOME ORGANOPHOSPHORUS INSECTICIDES ON ADSORBING SURFACES AS AFFECTED BY FORMULATION,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
For primary bibliographic entry see Field 5B.
W74-05435

A NEW BENZENE-ETHANOL-WATER SOLVENT SYSTEM FOR TLC SEPARATION OF AFLATOXINS,
Best Foods Research Center, Union, N.J.
A. E. Waltking, G. W. Bleffert, M. Chick, and R. Fogerty.
Journal of the American Oil Chemists' Society, Vol 50, No 10, p 424-425, October 1973. 1 tab, 3 ref.

Descriptors: *Separation techniques, Aqueous solutions, *Gas chromatography, Solvents, *Chromatography, Organic compounds.
Identifiers: *Aflatoxins, Thin layer chromatography, Gas liquid chromatography, *Solvent systems, Chemical composition, *Benzene, *Ethanol, Mycotoxins.

Gas liquid chromatography was used to determine the composition of the benzene-ethanol-water (BEW) solvent system frequently used in the separation of aflatoxins by thin layer chromatography. Investigation of a rapid procedure for preparing and using this solvent system led to the discovery of a new BEW solvent system with advantages for the routine determination of aflatoxins in roasted nut products, which consists of benzene-ethanol-water 40:6:3 for the trough solution and 4:27:20 for the bottom solution. Because ethanol is the most costly reagent in this solvent system and the bottom layer contains four times as much ethanol as the top layer, it is worthwhile to use the bottom layer repeatedly. The instantly prepared BEW system containing benzene-ethanol-water 41:7:1 in the top layer and 5:28:18 in the bottom layer was used in our laboratory almost exclusively for over a year with repeatedly excellent resolution. The bottom layer (50 ml) was not replaced or supplemented during an entire week's operation, which ranged between 5 and 20 plates, while 25 ml of the top layer was pipetted into a clean trough for each run. Evaluation of this system by six laboratories over the past year has shown it to be consistently superior to the previous BEW solvent system and less affected by climatic conditions. Optimum results are obtained by placement of the developing chamber in a constant temperature cabinet at 68-70F. (Mortland-Battelle)
W74-05436

A STUDY OF THE STABILITY OF A NITROGEN-SELECTIVE THERMIONIC DETECTOR,
Laboratory of the Government Chemist, London (England).
T. A. Gough, and K. Sugden.
Journal of Chromatography, Vol 86, No 1, p 65-71, November 1973. 4 fig, 6 tab, 18 ref.

Descriptors: Stability, *Gas chromatography, *Pollutant identification, Nitrogen, Aqueous solutions, Selectivity.
Identifiers: *Thermionic detector, *Flame ionization detector, Comparative studies, *Nitrogen detector, *Nitrosamines, Performance evaluation, Dimethylnitrosamines, Diethylnitrosamines, Dipropylnitrosamines.

The stability of a thermionic detector fitted with a rubidium chloride tip has been studied by comparison with the performance of a conventional flame ionisation detector. The variations of response of the detectors to a given set of conditions over an extended period of time have been measured. A Pye 104 Chromatograph fitted with thermionic (TD) and flame ionisation detectors (FID) was used. A primary standard solution containing 100 microliters/l of dimethyl-, diethyl-, and dipropylnitrosamines (DMN, DEN and DPN) in water was used throughout the study. 3-microliter aliquots of this and other standards, prepared by dilution, were injected daily over a period of several weeks in order to follow the variations of response of the two detectors. Variations of response of the TD are significantly higher than those of a conventional flame detector. The sensitivity of the TD falls with age, but can be restored by cleaning the probe. For some simple nitrosamines response is a function of nitrogen content. Analysis of dirty extracts does not subsequently affect the sensitivity of the TD. The noise level and detection limits for the nitrosamines are at least an order of magnitude higher on the TD than on the FID. (Mortland-Battelle)
W74-05437

AN AUTOMATIC SAMPLE LOADER FOR COLUMN CHROMATOGRAPHY,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Protein Chemistry.
H. Lindley, R. W. Cranston, W. J. A. Sutherland, and C. L. Ritchie.
Journal of Chromatography, Vol 86, No 1, p 178-183, November 1973. 4 fig, 2 ref.

Descriptors: *Automation, Amino acids, Instrumentation, *Chromatography, Automatic control, *Sampling.
Identifiers: *Column chromatography, *Sample loader, Programmer, Controller.

An automatic sample loader is described that has been used continuously for 3 years with an amino acid analyzer. An electronic programmer controls loading, all timed sequences, a six-position, 10-channel buffer flow valve, and the pumps. Samples are loaded through two discs with four pairs of holes each. These discs are held together by spring pressure and sealed by neoprene 'O' rings recessed into the top disc. The buffer pumps, lines, and connections are held by the stationary top disc. Sample coils, with identical volumes, are held by the rotating bottom disc. Sample overlap is allowed at each end through control of pumping time and use of sample coils of slightly less volume than the sample used. This prevents the loading of air. Approximate loading time is three minutes. Desirable features of the system include: (1) single-dual-column loading, (2) ease of adding or subtracting samples during operation, (3) automatic introduction of samples into the sample loops, and (4) low cost. A possible criticism of the apparatus is the chance evaporation or contamination of samples because the sample cups are not completely sealed. Several points in answer to this criticism are discussed. (Mortland-Battelle)
W74-05438

METAPERIODATE - A NEW STRUCTURE-SPECIFIC LOCATING REAGENT FOR PHENOLIC COMPOUNDS,
University of Strathclyde, Glasgow (Scotland). Dept. of Food Science.
M. N. Clifford, and J. Wight.
Journal of Chromatography, Vol 86, No 1, p 222-224, November 1973. 1 tab, 3 ref.

Descriptors: *Phenols, Aqueous solutions, Ethers, *Chromatography, *Pollutant identification.
Identifiers: *Metaperiodate, *Paper chromatography, *Chromogenic reagents, Dihydroxyphenols, Monomethyl ethers.

The use of metaperiodate as a reagent in detecting phenolic compounds and its structure specificity were investigated. Several compounds listed were dissolved in propan-2-o1 (70 percent w/v) at a concentration of 5 mg/ml. Saturated 5 percent w/v and 0.5 percent w/v aqueous solutions of analytical grade potassium metaperiodate were used as spray reagents. A sheet of Whatman No. 1 chromatography paper was sprayed with one of the metaperiodate solutions and allowed to dry. Each phenolic solution was applied to the metaperiodate-treated papers at levels of 1, 5 and 10 micrograms using a micro-pipette. Failure to produce a detectable color within 10 min was taken as a negative response. Metaperiodate (0.5 percent) detected microgram quantities of o-and p-dihydroxyphenols and their monomthyl ethers by producing a yellow-orange color. This response was essentially independent of other substituents (carboxyl, hydroxyl, methoxyl, propenoic acid), but vanillin, vanillic acid and methyl vanilloyl ketone responded less readily, a 5-microgram loading being necessary to give a positive response. In all other cases a 1-microgram loading was detected. (Mortland-Battelle)
W74-05439

SPECTROPHOTOMETRIC DETERMINATION OF URANIUM(VI) WITH 7-CHLORO-8-HYDROXYQUINOLINE-5-SULPHONIC ACID,
Birla Inst. of Tech. and Science, Pilani (India). Chemical Labs.
B. K. Avinashi, and S. K. Banerji.
Microchemical Journal, Vol 18, No 5, p 543-547, October 1973. 2 fig, 14 ref.

Descriptors: *Spectrophotometry, *Aqueous solutions, *Chemical analysis, *Methodology, Pollutant identification, Cations, Anions, Chelation, Pollutants, Hydrogen ion concentration, Time, Temperature.
Identifiers: *Chromogenic reagents, *Uranium, Ionic interference, Metal chelates, Absorbance, Precision, Trace levels, Chemical indicators, Complexation, 7-Chloro-8-hydroxyquinoline-5-sulfonic acid, Chemical concentration, Chemical composition, Chemical structure, Molar absorptivity, Chemical interference.

Uranium(VI) and 7-chloro-8-hydroxyquinoline-5-sulfonic acid form a 1:2 orange-red complex with gamma sub max at 355 nm, in aqueous solution at pH 6.6. An aliquot of standard uranium solution (38 ppm) is combined with a pH 6.6 buffer, 1 M NaCl04 and 0.002 M reagent. The volume is adjusted to 25 ml with distilled water and the mixture allowed to stand for 30 minutes to attain equilibrium. Absorbance was measured against the reagent blank at 355 nm. The color of the uranium complex develops instaneously and remains constant for at least 24 hours at room temperature. With an increase in temperature, a decrease in the value of absorbance of the complex was observed. A study of the effect of reagent concentration at a pH 6.6 plus or minus 0.1 and 355 nm indicated that there should be at least 6 fold molar excess of the reagent over U(VI) concentration for maximum color formation of the complex. Varying the order in which the reagents were added had no significant effect on the results. Range for adherence to Beer's law, effective photometric range, molar absorptivity, and Sandell sensitivity are reported as 1-38 ppm, 5.7-28.5 ppm, 6575 and 0.036 microgram of uranium/sq cm, respectively. The method has been compared with some other methods for determination of uranium spectrophotometrically, with regard to their sensitivities. Interferences of various ions in the measurement of the color have been investigated, and the tentative structure of the colored species has been proposed. (Holoman-Battelle)
W74-05442

MICRODETERMINATION OF THIOCYANATES WITH N-BROMOSUCCINIMIDE USING BORDEAUX RED AS AN INDICATOR,
Pakistan Council of Scientific and Industrial Research, Lahore.
M. Sarwar, H. A. Waheed, M. A. Chowdhri, and R. J. Thibert.
Mikrochimica Acta, No 5, p 683-688, 1973. 3 tab, 12 ref.

Descriptors: *Volumetric analysis, *Aqueous solutions, Methodology, Chemical analysis, *Pollutant identification, Chemical reactions.
Identifiers: *Thiocyanates, *Bordeaux red, Chemical indicators, *Bromosuccinimide, Precision, Accuracy, Chromogenic reagents.

N-bromosuccinimide has been used as a direct titrant for thiocyanates with bordeaux red as an indicator. In case of ammonium thiocyanate, nitrogen is evolved. While in case of potassium thiocyanate 0.5- to 2-mg samples were analyzed and maximum relative standard deviation was 1 percent in case of 0.5-mg sample. In case of ammonium thiocyanate 0.3- to 2.5-mg samples were analyzed and maximum relative standard deviation was 0.9 percent in case of 0.7-mg sample. The method is quick, precise and accurate. (Holoman-Battelle)
W74-05443

THE DETERMINATION OF BARIUM BY FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY USING A MODIFIED GRAPHITE TUBE ATOMIZER,
G. D. Renshaw.
Atomic Absorption Newsletter, Vol 12, No 6, p 158-160, November/December 1973. 4 fig, 1 tab, 13 ref.

Descriptors: *Pollutant identification, Separation techniques, Solvent extractions, Aqueous solutions, *Spectrophotometry.
Identifiers: *Barium, Flameless atomic absorption spectrophotometry, *Graphite furnace, Atomization, Tantalum liner.

Sensitivities for barium determination are compared by flameless atomic absorption spectrophotometry employing an HGA-70 Graphite Furnace both with and without a tantalum cylinder insert. The mode of barium atomization within the furnace is discussed with reference to carbon-metal atom interactions in order to explain sensitivity differences. A solvent extraction method for the preconcentration of barium, prior to determination in the modified carbon tube furnace, is also mentioned. Solutions containing 1-10 ng Ba/20 microliters were prepared by dilution with distilled water of a 1000 micrograms/ml (w/v) stock solution of barium in 0.1 N HClO4. The solutions were stored in polythene bottles previously soaked in 10 percent HNO3. Analytical grade thenoyltrifluoroacetone (TTA) was dissolved in metyl isobutyl ketone (MIBK) to make a 0.1 M solution. Thymol blue was used as an internal indicator. The tantalum cylinder inserts (liners) were constructed from 0.002-in thick foil (99.9 percent purity). It is estimated that the lifetime of a liner would be equivalent to at least 200 determinations and each liner costs only a fraction of the cost of the replacement carbon tubes. With the tantalum liner insert, the sensitivity increased twenty fold. The detection limit (defined as signal:noise ratio equals 2) with the modified tube is 10. In terms of concentration, the detection limit, assuming one uses the maximum sample volume of 100 microliters is 0.001 ppm). Comparison with the conventional flame nebulizer shows a hundred-fold increase in sensitivity. (Mortland-Battelle)
W74-05444

A PRELIMINARY PROCEDURE FOR THE DETERMINATION OF CADMIUM IN BLOOD,
Department of Employment, London (England). Medical Services Div.
A. A. Cernik.
Atomic Absorption Newsletter, Vol 12, No 6, p 163-164, November/December 1973. 3 fig, 1 tab, 5 ref.

Descriptors: *Cadmium, *Methodology, Oxidation, *Pollutant identification, Heavy metals, Trace elements, *Spectrophotometry.
Identifiers: *Blood, *Atomic absorption spectrophotometry, Biological samples, Delves cup method, Reproducibility.

In such a complex medium as blood, the volatility of cadmium gives rise to difficulties, since this metal has a vapor pressure of 1.0 mm at 394C which is very similar to the temperature of the burning organic matrix. In order to separate the cadmium, it is necessary, therefore, to remove the organic material completely. Using the Delves cup cadmium vaporizes 2.2 sec after insertion of the crucible into the flame. The partial oxidation obtained by hydrogen peroxide described by Delves for blood lead analyses will not suffice for resolution of the matrix from the cadmium. The method described here shows that dry oxidation can produce a clear unobstructed cadmium signal. For replicate 20-microliter samples of blood with 0.0004 microgram cadmium added, dried at 100C, followed by oxidation at 425C for 6.0 min loss of cadmium varies between 6-10 percent. Replication of signals from 20 microliters of blood found to have a concentration of 0.0005 microgram cadmium (2.5 micrograms/100 ml) gave an S.D. equals 0.189 microgram cadmium/100 ml of blood. Absolute sensitivity of the method was 23 pg Cd. If the oxidation step is standardized closely with respect to temperature and time, maximum retention of cadmium can be achieved along with complete resolution from any molecular absorption. (Mortland-Battelle)
W74-05445

RING-DISK ELECTRODE STUDY OF THE ANODIC BEHAVIOR OF GOLD IN 0.2M SULFURIC ACID,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W74-05446

SEPARATION OF MONOSUBSTITUTED PHENOL ISOMERS USING LIQUID CRYSTALS,
North Dakota Univ., Grand Forks. Dept. of Chemistry.
L. E. Cook, and R. C. Spangelo.
Analytical Chemistry, Vol 46, No 1, p 122-126, January 1974. 1 fig, 5 tab, 21 ref.

Descriptors: *Separation techniques, *Pollutant identification, *Gas chromatography, Methodology, Chemical reactions, Phenols, Time, Chemical analysis.
Identifiers: *Liquid crystals, *Monosubstituted phenols, *Isomeric phenols, Derivatization, Phenyl n-alkyl ethers, Aromatic hydrocarbons, Isomers, Flame ionization gas chromatography, Thermal conductivity gas chromatography, 2-Methylphenol, 3-Methylphenol, 4-Methylphenol, o-Methylphenol, m-Methylphenol, o-Methoxyphenol, m-Methoxyphenol, o-Chlorophenol, m-Chlorophenol.

The separation of several isomeric monosubstituted phenols by gas chromatographic means using liquid crystal stationary phases has been studied. The method described herein utilizes both a derivatization technique, to improve peak symmetry and a liquid crystal stationary phase to increase resolution. The method of preparation of derivatives is simple, fast, and uses only reagents commonly found in the laboratory. The method is amenable to flame ionization and thermal conductivity detectors. While the separation of the isomeric phenols was partially successful, complete separation of the isomers was obtained when the phenols were converted to substituted phenyl n-

alkyl ethers. Separation factors for the meta- and para-substituted ether isomers ranged from 1.06 to 1.25. The effect of increasing the length of the n-alkyl chain was studied and found to increase the separation factor as the chain length increased. The polarity and the molecular shape of the solutes were major factors in determining the separation of the isomers. Converting the phenol to an ether and running the GC analysis required only 1-1/2 hours. (Holoman-Battelle)
W74-05447

DETERMINATION OF CACODYLIC ACID (HYDROXYDIMETHYLARSINE OXIDE) BY GAS CHROMATOGRAPHY,
California Univ., Davis. Dept. of Environmental Toxicology.
C. J. Soderquist, D. G. Crosby, and J. B. Bowers.
Analytical Chemistry, Vol 46, No 1, p 155-157, January 1974. 2 fig, 1 tab, 18 ref.

Descriptors: *Arsenicals(Pesticides), *Pollutant identification, *Soil analysis, *Water analysis, Methodology, Herbicides, Chemical analysis, Chemical reactions, Hydrogen ion concentration, Time, Selectivity, *Gas chromatography.
Identifiers: Electron capture gas chromatography, *Cacodylic acid, Detection limits, Chemical recovery, Derivatization, Gas liquid chromatography, Sample preparation, Distilled water, Iododimethylarsine, Hydroxydimethylarsine oxide, Methanearsonic acid, Retention time.

The conversion of cacodylic acid to iododimethylarsine with hydriodic acid, followed by a determination with electron-capture gas chromatography constitute the method whereby cacodylic acid and its salts can be determined rapidly with detection limits below 0.05 ppm in water and 0.5 ppm in soil. Those parameters that would possibly affect the analytical recovery of cacodylic acid were examined. (1) Recoveries were independent of sample pH and proved the method to be selective. (2) Reaction with hydriodic acid was complete and quantitative within 15 seconds provided that less than 20 microliters of sample water remained per 100 microliter of added hydriodic acid. (3) Iododimethylarsine solutions in organic solvent at ng/microliter levels exhibited decomposition within 30 min. Major advantages include simplicity and rapid analysis; dried soil samples can be weighed, derivatized, and analyzed in less than 10 minutes, and water samples, once evaporated, require a similar amount of time. The instability of iododimethylarsine was circumvented by using a standard curve based on fortification, and by analyzing each sample in triplicate. (Holoman-Battelle)
W74-05448

DETERMINATION OF CYANIDE IN ITS PLATINUM AND PALLADIUM COMPLEXES,
IBM Watson Research Center, Yorktown Heights, N.Y.
B. L. Gilbert, B. L. Olson, and W. Reuter.
Analytical Chemistry, Vol 46, No 1, p 170-171, January 1974. 1 tab, 16 ref.

Descriptors: Methodology, *Pollutant identification, Chemical analysis, Ammonia, Chemical reactions, Pollutants, Heavy metals, Analytical techniques.
Identifiers: *Cyanides, *Platinum, *Palladium, *Metal complexes, Chemical recovery, Chemical interference, Accuracy, Absorbance, Metal cyanides, Stability constants, Ammonium.

An analytical procedure is presented for the quantitative determination of cyanide in the presence of strongly complexing metal ions and large concentrations of ammonium ion. Decomposition of the sample is accomplished in a flow of hydrogen at an elevated temperature. The accuracy of this method was tested with K2Pt(CN)4.3H2O; its stoichiometry was verified by Pt and K analyses. Ten CN analyses were made on samples in the range from 65 to 1200 micrograms using the hydrogen reduction technique. Recoveries of 99 plus or minus 4 percent (STD) were obtained. NH3 precent in excess of 50 micrograms/ml in the final test solution decreases the absorbance of the CN color complex. Nine separate determinations of 43 micrograms of CN in the presence of a 100-fold excess of Pd and NH3 gave an average recovery of 101 plus or minus 5 percent (STD). Similar to NH3, bromide was found to quench the color complex when present in excess of 2 micrograms/ml in the final test solution. (Holoman-Battelle)
W74-05449

DETERMINATION OF POTASSIUM BY MEANS OF THE COTLOVE CHLORIDOMETER,
Wagner Coll. Science Center, Staten Island, N.Y. Dept. of Chemistry.
W. P. Ferren, and J. A. Cucco.
Analytical Chemistry, Vol 46, No 1, p 174-176, January 1974. 2 tab, 21 ref.

Descriptors: *Potassium, *Aqueous solutions, *Gravimetric analysis, *Pollutant identification, Alkali metals, Instrumentation, Laboratory equipment.
Identifiers: *Chloridometer, Coulometry, Potassium nitrate.

A coulometric procedure is described for determination of potassium using the Cotlove chloridometer. In the procedure reported here aqueous potassium nitrate solutions were used. A modified standard chloridometer titration solution was used. 1.8 grams of polyvinyl alchohol were dissolved in 100 ml of hot distilled water and cooled to room temperature. The potassium chloridometer titration solution was prepared by adding 6.4 ml of concentrated nitric acid to 700 ml of distilled water, with good agitation, and subsequently adding 100 ml of glacial acetic acid, 100 ml of the polyvinyl alcohol solution, and finally 100 ml of ethyl alcohol. Acid 'blanks' were coulometrically titrated by the generation of silver ions at the chloridometer HIGH setting. The above procedure was repeated except this time 0.1 ml of 0.2 M sodium tetraphenylboron solution plus 0.1 ml of 0.1 M potassium nitrate solution was added to an empty chloridometer vial and 2 minute reaction time was allowed before adding the 4 ml of acid reagent. The difference between the digital readout in the two series represents the potassium content of the second system. (Mortland-Battelle)
W74-05450

NOVEL METHOD FOR SAMPLING OIL SPILLS AND FOR MEASURING INFRARED SPECTRA OF OIL SAMPLES,
Rhode Island Univ., Kingston. Dept. of Chemistry.
C. W. Brown, P. F. Lynch, and M. Ahmadjian.
Analytical Chemistry, Vol 46, No 1, p 183-184, January 1974. 3 fig, 1 ref.

Descriptors: *Oil spills, *Sampling, Methodology, Separation techniques, *Pollutant identification, *Spectrophotometry.
Identifiers: *Infrared spectra, *Oil fingerprinting, Oil characterization, Infrared spectrophotometry.

A method is described for measuring infrared spectra of oil, which also separates water from the samples. Samples are collected by dipping Al foil into water containing the oil or by smearing the oil on Al foil. The oil adheres to the foil, whereas the water is repelled and will eventually drain off. In this way, most of the water is eliminated from the samples. The foil also serves as an excellent 'sample cell' for oil samples. To eliminate the need for removing the oil from the foil after the water drains off, the spectrum can be measured by replacing one of the plane (flat) mirrors in the sample optical path with the Al foil. All of the spectra were recorded on a Perkin-Elmer Model 521 infrared spectrometer. To obtain a spectrum of an oil sample on Al foil, the foil is placed on the backing plate with its shiny surface toward the light beam - i.e., the foil is used as a reflector surface replacing mirror M2. All mirrors including the Al plate (at M2) are adjusted in the prescribed manner to give a maximum transmitted signal at 2000/cm (a frequency at which the oil does not absorb), and a spectrum is recorded in the usual manner. (Mortland-Battelle)
W74-05451

THE DETERMINATION OF A STABILITY CONSTANT FOR THE AQUEOUS COMPLEX ZN(OH)2 USING ANODIC STRIPPING VOLTAMMETRY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
W. L. Bradford.
Limnology and Oceanography, Vol 18, No 5, p 757-762, September 1973. 1 fig, 3 tab, 19 ref.

Descriptors: *Zinc, Mathematical studies, Anions, Sodium chloride, Aqueous solutions, Electrodes, Hydrogen ion concentration, Methodology, *Heavy metals, *Volumetric analysis.
Identifiers: *Stability constants, *Anodic stripping voltammetry, Stripping current, Zinc hydroxide, Ion selective electrodes, Metal complexes.

The shift in the potential of the zinc stripping current maximum observed in anodic stripping voltammetry is related to the free energy of the reaction between ionic zinc and a complexing anion. The model was tested using the zinc hydroxyl system; the agreement with experimental results was excellent. The findings suggest the existence of the aqueous complex, Zn(OH)2, which has been reported only once before. The stability constant calculated here is in good agreement with the single published value. As an experimental technique, this has the advantages of avoiding dependence on a solid phase and of making measurements at concentrations similar to those in natural waters. It could be valuable in the study of zinc, cadmium, and lead complexes. The technique can thus be applied only to those complexes whose formation rates are both very fast and faster than those of different order complexes occurring in the test solution. (Mortland-Battelle)
W74-05455

TEMPORAL AND DEPTH STUDY OF ALKALINE EARTH CHLORINITY RATIOS IN SEAWATER AT A SINGLE STATION SOUTH OF PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Marine Sciences.
For primary bibliographic entry see Field 5B.
W74-05457

THE PERSISTENCE AND MOVEMENT OF PICLORAM AND 2,4,5-T IN SOILS,
North Carolina State Univ., Raleigh. Pesticide Residue Research Lab.
For primary bibliographic entry see Field 5B.
W74-05459

A USEFUL SPRAY REAGENT TO DIFFERENTIATE COMMON PHENOLIC COMPOUNDS ON THIN-LAYER PLATES AND PAPER CHROMATOGRAMS,
Macdonald Coll., Ste. Anne de Bellevue (Quebec). Genetics Lab.
B. H. Somaroo, M. L. Thakur, and W. F. Grant.
Journal of Chromatography, Vol 87, No 1, p 290-293, December 5, 1973. 1 tab, 9 ref.

Descriptors: *Phenols, *Pollutant identification, *Color reactions, Chemical analysis, Organic compounds, Chemical reactions, Ammonia, Color, *Chromatography.
Identifiers: *Thin layer chromatography, *Chromogenic reagents, *Paper chromatography, 2-Aminoethyl diphenylboric acid ester, Aromatic hydrocarbons, Anthocyanidins, Flavonols,

Flavones, Glycoflavones, Hydroxycinnamic acid, Methoxycinnamic acid, Diazotized p-nitroaniline, Aluminum chloride, Sodium carbonate.

2-Aminoethyl diphenylboric acid ester (AEDBE) has been found to be quite useful in the detection of phenolic compounds being analyzed by thin-layer and paper chromatography. Both AEDBE and 5 percent AlCl3, can be used to differentiate certain phenolics (anthocyanidins). Diazotized p-nitroaniline (DPN), which has been largely used to characterize phenolic acids, is also useful spray reagent to separate some of the common flavonols. AEDBE is extremely useful to differentiate some of the common phenolic compounds belonging to the anthocyanidin, flavonol, flavone and hydroxycinnamic acid groups. (Holoman-Battelle)
W74-05460

EFFECTS OF PH AND TEMPERATURE ON THE FATTY ACID COMPOSITION OF BACILLUS ACIDOCALDARIUS,
Consiglio Nazionale delle Ricarche, Naples (Italy). Laboratorio di Chimica e Fisica di Molecole di Interesse Biologico.
For primary bibliographic entry see Field 5C.
W74-05461

INTERFERENCE OF NON-HYDROCARBONS IN OIL-IN-WATER DETERMINATION,
Koninklijke/Shell-Laboratorium, Amsterdam (Netherlands).
A. L. Bridie, J. Bos, and S. Herzberg.
Journal of the Institute of Petroleum, Vol. 59, No. 570, p 263-267, November 1973. 2 fig, 6 tab, 3 ref.

Descriptors: *Water analysis, *Separation techniques, *Gas chromatography, *Oily water, *Organic matter, Solvent extractions, Adsorption, Oxidation, Oil pollution, Oil-water interfaces.
Identifiers: Sample preparation, Chemical interference, *Photooxidation, CONCAWE's method, Organic solvents, Kerosene, Accuracy, Chromatograms, Aromatic hydrocarbons.

To accurately measure the amount of oil in water, it is necessary to separate non-hydrocarbons from hydrocarbon material in the samples. Several points were studied toward the development of a satisfactory separation procedure: the formation of oxidation products of mineral oil components in water; the extraction of such oxidation products along with the hydrocarbons and the effect of the solvent (n-pentane, benzene, chloroform or carbon tetrachloride) on the extraction; and the removal of the polar or polarizable products from an extract by means of adsorption on Florisil. Samples were analyzed by gas chromatography. The following was concluded from the studies: (1) All current solvents extract the same amount of hydrocarbon compounds from a (waste) water sample. n-Pentane extracts the smallest amount of oxidation products (non-hydrocarbons). (2) Florisil properly removes the relevant non-hydrocarbons from an n-pentane extract. A disadvantage of this solvent is that some 10-25 percent of the aromatic hydrocarbons are also removed. (3) Solvents that are more polar than n-pentane extract more non-hydrocarbon material from a water sample and are less susceptible to a treatment with Florisil. (4) A suitable procedure is to shake 10 ml n-pentane extract with 1 g of 30/60 mesh Florisil for two or three minutes. (5) Apart from biochemical oxidation (photo)-chemical oxidation may produce far more oxidation products of mineral oil components and within a shorter period of time than is sometimes assumed. (6) For the determination of oil dissolved in (waste) water CONCAWE's method IIIB is recommended. (Little-Battelle)
W74-05462

INOSITOL POLYPHOSPHATES IN ACTIVATED SLUDGE,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia).
For primary bibliographic entry see Field 5B.
W74-05467

THE DETERMINATION OF BORON IN SOLUTION TO SUB-P.P.B. CONCENTRATIONS BY HOLLOW-CATHODE EMISSION,
Virginia Univ., Charlottesville. Dept. of Chemistry.
E. H. Daughtrey, and W. W. Harrison.
Analytica Chimica Acta, Vol 67, No 2, p 253-258, December 1973. 4 fig, 17 ref.

Descriptors: *Boron, *Aqueous solutions, Water analysis, Trace elements, *Spectroscopy.
Identifiers: *Detection limits, *Hollow cathode emission, Emission spectroscopy.

Sub-ppb concentrations of boron in solution were determined by the use of a hollow-cathode emission source for the analysis of cathode surface film deposited from the solution. Solutions were prepared by dissolving boric acid or sodium tetraborate in distilled, deionized water. A Glomax demountable hollow-cathode lamp operating in the flow mode, was used with two modifications. A gas port modification and a replacement of the constricted flow concentric tubing (serving as both cooling water source and drain to the heat exchange block) with a Swagelok Tee-joint fitting and a short length of thin wall stainless steel tubing joined to the heat exchange block by a machine fitting. Copper proved to be an excellent cathode material, owing to low background and ease of boron sputtering from the surface. Clean-up of the cathode was a critical factor in reproducibility of hollow-cathode emission. The best signal-to-background intensity was at 0.7 torr pressure of argon, measured on the exit side of the tube. The lower limit of atomic emission detection is about 10 pg, although the sensitivity couid be improved by multiple sample applications. The boron atomic line emission is 200 times as intense as boron oxide band emission. (Little-Battelle)
W74-05468

THE EXTRACTION-SPECTROPHOTOMETRIC DETERMINATION OF CHROMIUM (III) WITH 4-(2-PYRIDYLAZO)-RESORCINOL,
Hokkaido Univ., Sapporo (Japan). Lab. of Analytical Chemistry.
T. Yotsuyanagi, Y. Takeda, R. Yamashita, and K. Aomura.
Analytica Chimica Acta, Vol 67, No 2, p 297-306, December 1973. 8 fig, 21 ref.

Descriptors: *Separation techniques, *Chromium, *Aqueous solutions, *Spectrophotometry, Heavy metals, Water analysis, Absorption, Color, *Solvent extractions.
Identifiers: Chemical interference, Sensitivity, Sample preparation, Metal chelates, *Resorcinols.

The extraction-spectrophotometric determination of chromium (III) with 4-(2-pyridylazo)-resorcinol (PAR) is described. PAR(H2R) forms a 1:3 complex with chromium (III) in a boiling acetate buffer solution at pH 5. The complex forms an ion-association compound with tetradecyldimethylbenzylammonium ion (TDBA):Cr(R)(HR)2(minus)-TDBA which can be extracted into chloroform, the molar absorptivity being 47,000 at 540 nm. If EDTA is added as a masking agent after the Cr(HR)3 has been formed, only iron, cobalt and nickel interfere seriously, and the method can be made specific for chromium by a preliminary extraction of these metals with cupferron. The sensitivity of the method is seven times higher than that of the diphenylcarbazide method. (Little-Battelle)
W74-05470

THE SPECTROPHOTOMETRY AND SOLVENT-EXTRACTION BEHAVIOUR OF IRON(III), VANADIUM(IV AND V) AND TITANIUM(IV) CHELATES OF 1-(O-CARBOXYPHENYL)-3-HYDROXY-3-METHYLTRIAZENE,
Jadavpur Univ., Calcutta (India). Dept. of Chemistry.
A. K. Majumdar, B. C. Bhattacharyya, and B. C. Roy.
Analytica Chimica Acta, Vol 67, No 2, p 307-315, December 1973. 4 fig, 5 ref.

Descriptors: *Spectrophotometry, *Solvent extractions, *Iron, *Titanium, Separation techniques, Cations, Anions, Heavy metals, Aqueous solutions, Water analysis.
Identifiers: *Metal chelates, *Vanadium, Chloroform, Sulfuric acid, Tartaric acid, Chemical interference.

1-(o-Carboxyphenyl)-3-hydroxy-3-methyltriazene is proposed as an excellent reagent for the spectrophotometric determination of iron(III) and titanium(IV), and also for the separation of titanium from a large quantity of iron as well as other cations and anions. Iron(III) forms an anionic violet 1:2 complex at pH 4.0-9.4, and a cationic green 1:1 complex at pH 1.5-2.0, with absorption maxima at 570 nm and 660 nm, respectively. The violet complex is quantitatively extracted in chloroform containing n-octylamine at pH 3.0-9.0. The green and the violet iron(III) complexes obey Beer's law, the respective optimal ranges between 8.9-35.8 and 3.9-11.2 ppm. The yellow titanium chelate extracted into chloroform (absorption maximum at 410 nm) between pH 1.0 and 3.5, can be reextracted into concentrated sulphuric acid and a violet color being produced with absorption maximum at 530 nm. Beer's law is obeyed in the ranges 0.8-5.7 ppm for the titanium complex in chloroform and 3.4-19.2 ppm when extracted in concentrated sulphuric acid. Interferences from diverse ions are not severe. Procedures for the separation and determination of titanium in the presence of a large quantity of iron are given. The isolation of the iron(III) and vanadium(IV and V) complexes, and their properties, are described. (Mortland-Battelle)
W74-05471

SYNERGIC SOLVENT EXTRACTION OF DIVALENT CATIONS WITH DECAFLUOROHEPTANEDIONE AND DI-N-BUTYLSULFOXIDE,
Hewlett-Packard Co., Avondale, Pa. Avondale Div.
C. A. Burgett.
Analytica Chimica Acta, Vol 67, No 2, p 325-330, December 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Solvent extractions, *Iron, *Cobalt, *Nickel, *Lead, Copper, Hydrogen ion concentration, Stability, Cations, Separation techniques, *Volumetric analysis, Heavy metals, Aqueous solutions, Water analysis, Efficiencies.
Identifiers: Equilibration time, Stoichiometry, Chemical interference.

The synergic solvent extaction of iron(II), cobalt(II), nickel(II) and lead(II) with 1,1,1,2,2,6,6,7,7,7-decafluoro-3,5-heptanedione (H(FHD)) and di-n-butylsulfoxide (DBSO) into cyclohexane is described. The optimal pH, equilibration time, stoichiometry and stability of the extracted species were studied. Approximately 0.01 M solutions of the cations were prepared by dissolving the appropriate salt in deionized water. The stock solutions were then standardized by titration with EDTA, NAS serving as the indicator. Exactly 1.00 ml of the 0.01 M metal solutions was pipeted into a 15-ml screw-cap glass test tube. Then 1.00 ml of the appropriate buffer solution was added to each test tube. To each test tube 1.00 ml of a cyclohexane solution of DBSO and 1.00 ml of a cyclohexane solution of H(FHD) was added. The mixture was shaken for 1 h and the phases were allowed to separate. The equilibrium pH of the aqueous phase was measured. A 1.00-ml aliquot of the aqueous phase was removed for determination of the amount of unextracted metal

by titration with EDTA as described above. For all of the metals studied, highly efficient extraction occurred at equilibrium pH values of 4.5-6.0. No detrimental effect from the presence of chloride, acetate, sodium or acetic acid was observed. The extraction was found to be quantitative after equilibration times of 15 min or more. All of the extracted species, except the iron(II) complex, were stable for a period of two weeks and could be dried at 100C. The iron(II) complex was stable after one day at low pH, but at pH 6.0 the complex was stable for one week. (Mortland-Battelle)
W74-05472

THE APPLICATION OF PHOTO-OXIDATION TO THE DETERMINATION OF STABLE COBALT IN SEA WATER,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England).
H. R. Harvey, and J. W. R. Dutton.
Analytica Chimica Acta, Vol 67, No 2, p 377-385, December 1973. 4 fig, 2 tab, 8 ref.

Descriptors: *Cobalt, *Sea water, *Water analysis, Methodology, Chemical analysis, Pollutant identification, Trace elements, Heavy metals, *Polarographic analysis, Chemical precipitation, Surface waters.
Identifiers: *Photooxidation, *Pulse polarography, Preconcentration, Detection limits, Trace levels, Sample preparation, Manganese dioxide, Chemical recovery, Chemical concentration.

A method is described for the determination of nanogram quantities of cobalt in a 1-l sample of seawater after preconcentration with sub-milligram quantities of manganese dioxide formed by the oxidation of manganese(II) in a photochemical reactor. The cobalt is measured by pulse polarography as the dimethylglyoximate after dissolving the manganese dioxide deposit adhering to the quartz jacket surrounding the ultraviolet lamp. The detection limit of the method is ca. 0.6 ng Co/l. (Holoman-Battelle)
W74-05473

SURFACTANT-SELECTIVE ELECTRODES. PART I. AN IMPROVED LIQUID ION-EXCHANGER,
Unilever Ltd., Port Sunlight (England). Unilever Research Lab.
B. J. Birch, and D. E. Clarke.
Analytica Chimica Acta, Vol 67, No 2, p 387-393, December 1973. 3 fig, 1 tab, 5 ref.

Descriptors: Fabrication, Solubility, *Surfactants, Anions, *Ion exchange, *Electrodes, *Sulfur compounds, *Sulfonates.
Identifiers: Dodecylsulfate electrodes, *Anionic surfactants, *Surfactant selective electrodes, Liquid ion exchanger, Ionic interference, n-Alkyl sulfates, Ion selective electrodes, Dodecyl sodium sulfate, Sodium tetradecyl sulfate, Sodium dodecylbenzenesulfonate, Sodium dodecylsulfonate, Sodium dodecenylsulfonate, Sodium dodecylethersulfate, Sodium dodecanoate, Marlon A, Alkylate 230 sulfate.

An improved electrode selective to the dodecylsulphate anion is described, which has no apparent effect on micellar properties. Electrodes selective to a variety of surfactant types have been prepared and the manufacture of electrodes specific to single alkyl chain length surfactants is discussed. An example is given of their use in the study of the precipitation of commercial surfactants. (Holoman-Battelle)
W74-05474

GOLD TWIN-ELECTRODES IN THIN-LAYER ELECTROCHEMISTRY,
Wichita State Univ., Kansas. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W74-05475

NEUTRON IRRADIATION OF MERCURY IN POLYETHYLENE CONTAINERS,
Naval Undersea Center, San Diego, Calif.
H. V. Weiss, and K. Chew.
Analytical Chimica Acta, Vol 67, No 2, p 444-447, December 1973. 2 tab, 3 ref.

Descriptors: *Mercury, *Irradiation, *Acidity, *Plastics, Adsorption, Neutron activation analysis, Aqueous solutions, Chemical analysis, Time, Heavy metals, *Radioactivity, Trace elements.
Identifiers: Chemical loss, Volatilization, Hg-197, Data interpretation, Cd-115-In-115.

When mercury is neutron-irradiated in polyethylene containers, its behavior is dependent on acidity of the solution. Mercury was irradiated for 10 and 60 min in solutions of different nitric acid concentration. For each of the time periods, the unacidified solutions contained less Hg-197 than their acidified counterparts; this difference was more pronounced for the 60-min irradiated samples. Comparison of activity levels for solutions irradiated for the two time intervals indicate the counting rates scale by a factor of six for the acidified solutions but not for water. Counting data are given for irradiation vials directly counted several days after neutron activation of cadmium and mercury solutions of varying acidity. With cadmium the counting rate decreased regularly as a function of nitric acid concentration, while with mercury the activity level in the unacidified sample was substantially less than for the samples in nitric acid solution. The relationship between the comparable ntric acid solutions of mercury parallels that of cadmium. From these results the conclusion is drawn that mercury in acidified solution is not lost during irradiation, at least not over the interval 10-60 min. But in the absence of acid, substantial loss is encountered. The loss appears to occur by two routes: adsorption and volatilization. (Holoman-Battelle)
W74-05476

A SIMULTANEOUS DETERMINATION OF ZINC AND CADMIUM,
Gustavus Adolphus Coll., St. Peter, Minn. Dept. of Chemistry.
R. E. Jensen, and M. Kaehler.
Analytica Chimica Acta, Vol 67, No 2, p 465-468, December 1973. 1 tab, 2 ref.

Descriptors: *Zinc, *Cadmium, *Aqueous solutions, Methodology, *Chemical analysis, *Pollutant identification, Stability, Trace elements, Cations, Heavy metals, Chelation, Solvent extractions, *Spectrophotometry.
Identifiers: Picolinealdehyde-2-quinolylhydrazone, *Atomic absorption spectrophotometry, Metal complexes, Extraction efficiency, Sensitivity, Detection limits, Ionic interference, Complexation.

This particular method for the simultaneous determination of zinc and cadmium involves using picolinealdehyde-2-quinolylhydrazone (PAQH) as the complexing agent, extracting from aqueous solution into chloroform, and completing the measurement by atomic absorption spectrophotometry. The most efficient complexation and extraction were obtained at pH 8.5. A study of excess of reagent on the zinc(II)-PAQH system showed that a fifteen-fold excess of ligand was sufficient for maximal complex formation. A twenty-fold excess of PAQH was necessary for maximal cadmium(II)-PAQH complex formation. Three 5-ml aliquots provided the greatest extraction efficiency. Solutions of both complexes were stable for a least one week. The Zn(II)-PAQH complex was found to obey Beer's law over a concentration range of 0.065-1.30 ppm. The sensitivity of measurement was calculated as 17.7 ppb, and the detection limit 3.13 ppb. A similar study of the Zn(II) complex absorbance over the same concentration range in aqueous solution gave the comparable sensitivity and detection limit as 27.8 ppb and 9.34 ppb, respectively. The Cd(II)-PAQH complex obeyed Beer's law over the same concentration range 0.113-2.26 ppm Cd(II). The sensitivity level was determined as 22.6 ppb, and the detection limit was 1.7 ppb. In comparable aqueous solutions, the sensitivity was 60.3 ppb, and the detection limit 10.5 ppb. Although it has been shown that there is no mutual interference between the zinc and cadmium complex systems, there are interferences from other cations. These interfering ions consume the reagent and must be removed before the analysis for zinc and cadmium. (Holoman-Battelle)
W74-05477

PHOTOMETRIC DETERMINATION OF DIPHENYLAMINE WITH CERIUM(IV) SULPHATE,
Andhra Univ., Waltair (India). Dept. of Chemistry.
M. Gandikota, and G. G. Rao.
Analytica Chimica Acta, Vol 67, No 2, p 469-472, December 1973. 1 fig, 2 tab, 10 ref.

Descriptors: *Pollutant identification, *Chemical analysis, *Spectrophotometry, Stability, Photometry, Pollutants, Methodology, Color reactions, Oxidation.
Identifiers: *Cerium sulfate, *Diphenylamine, Accuracy, Chemical interference, Aniline, Methanol, Ethanol, Sulfuric acid, Chemical concentration.

The conditions are established for the quantitative oxidation of diphenylamine with cerium(IV) sulfate to diphenylamine blue and its photometric determination. The results obtained from studying the effect of Cs(IV) concentration showed that with molar ratios of diphenylamine to Ce(IV) varying from 1:2.5 to 1:8 the diphenylamine blue is not destroyed even by a large excess of the oxidant over and above that required for the formation of the blue color. The stability of the blue color increases with increasing concentration of sulphuric acid, being about 5-6 min in 4M sulphuric acid, about 6-7 min in 5M sulphuric acid and about 9-10 min in 6M sulphuric acid. Compared with the available procedures this has the advantages of speed, fewer reagents and freedom from interference from aniline (0.08 nmoles), methanol (59 moles), and ethanol (17 nmoles). (Holoman-Battelle)
W74-05478

ANIONIC ELECTROPHORETIC PATTERN OF FIVE RUTHENIUM SALTS IN FRESH AND SEA WATER: EFFECTS OF AGING AND DILUTION,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium). Laboratoires.
J. Vos, S. Van Puymbroeck, and O. Van Der Borght.
Analytica Chimica Acta, Vol 67, No 2, p 480-485, December 1973. 2 fig, 16 ref.

Descriptors: *Waste dilution, Freshwater, Sea water, *Aging(Physical), Aqueous solutions, *Chemical analysis, *Salts, *Nuclear wastes, *Electrophoresis, Water analysis, Heavy metals, Methodology.
Identifiers: *Anionic electrophoresis, *Ruthenium salts, Dilution, Ruthenium nitrosylhydroxynitrite, Ruthenium nitrosylchloride, Ruthenium chloride, Ruthenium nitrosylhydroxide, Ruthenium nitrosylnitrate, Ru-106.

The presence of ruthenium species in the wastes of nuclear fuel reprocessing plants has led to considerable interest in the very complex behavior of ruthenium. In this study, five ruthenium salts (nitrosylhydroxynitrite, nitrosylchloride, chloride, nitrosylnitrate complexes, and nitrosylhydroxide) were studied for influence of dilution and aging, by means of high-voltage electrophoresis: (1) in concentrated aqueous solutions; (2) after further dilution with freshwater; and (3) after further dilution with seawater. This study provides further evidence of the complexity of ruthenium in aqueous neutral solutions and emphasizes the following

points, which are important for waste release management. (1) The behavior of the ruthenium salts is, in general, similar in filtered seawater and freshwater, except for fresh nitrosylnitrate solutions. (2) Aging is still incomplete after one week except for the ruthenium-nitrosylchloride complexes where there are no such effects. (3) Aging of the ruthenium solutions results generally in a decrease of the number of complexes, a decrease of their mobility and a severe decrease or total disappearance of the resolution of the separation pattern. (4) Ten-fold dilution had no important influence except for the fresh ruthenium chloride and the 7-day old nitrosylnitrate. (5) Nitrosylnitrite, and especially the aged solutions, contains an exceptionally low amount of Ru-106 adsorbed on the staring line. (6) The characteristics of nitrosylhydroxide solutions in fresh and seawater, are similar to the other salts. The freshly prepared solutions contain about 30 percent of negative complexes with comparatively high mobility in the electric field. (7) The number of species detected by high-voltage electrophoresis in phosphate buffer ranges up to 13 clearly defined bands and 2 vaguer tailings for freshly prepared concentrated neutral ruthenium-chloride complexes. Each salt gives a different electrophoretic separation picture, although complexes at 20-20.5 cm from the starting line appear in most solutions. (Holoman-Battelle)
W74-05479

GAS CHROMATOGRAPHY OF SUBSTITUTED PHENYLUREAS BY FLASH-HEATER METHYLATION WITH TRIMETHYLANILINIUM HYDROXIDE,
Agricultural Research Service, Fargo, N. Dak.
F. S. Tanaka, and R. G. Wien.
Journal of Chromatography, Vol 87, No 1, p 85-93, December 5, 1973. 2 fig, 3 tab, 11 ref.

Descriptors: *Herbicides, *Aromatic compounds, Monuron, *Urea pesticides, *Gas chromatography, Pollutant identification.
Identifiers: *Phenylureas, Gas liquid chromatography, *Methylation(Flash heater), Diuron, Fluometuron, Fenuron, Linuron, Metabromuron, Neburon, Methelutes.

A simple method for the methylation of substituted phenylureas with trimethylanilinium hydroxide (methelute) is described. The methylation reaction product was the 3-N-methyl analog of the substituted phenylurea. Seven phenylureas (fluometuron, fenuron, monuron, metobromuron, linuron, diuron, and neburon) with a variety of structures were analyzed using six different chromatographic columns. The gas chromatographic response was linear with increased concentration of the 3-N-methyl analogs of monuron and diuron for both synthetic standards and flash-heater reaction products. Maximum methylation was obtained when the ratio of methylating reagent to phenylurea was approximately 2.5:1. This methylation technique provides for rapid qualitative and quantitative chromatography of substituted phenylureas without side-chain decomposition. (Mortland-Battelle)
W74-05480

SEPARATION AND ANALYSIS OF MIXTURES OF CATIONIC SURFACE-ACTIVE AGENTS BY SALTING-OUT CHROMATOGRAPHY,
Kao Soap Co., Wakayama (Japan). Industrial Research Lab.
For primary bibliographic entry see Field 2K.
W74-05481

PERHALOBENZENESULFINATES AS REAGENTS IN THE DETERMINATION OF INORGANIC MERCURY IN VARIOUS MEDIA BY GAS-LIQUID CHROMATOGRAPHY,
North Carolina Univ., Chapel Hill. School of Medicine.
P. Mushak, F. E. Tibbetts, III, P. Zarnegar, and G. B. Fisher.
Journal of Chromatography, Vol 87, No 1, p 215-226, December 5, 1973. 6 fig, 1 tab, 12 ref.

Descriptors: *Mercury, Aqueous solutions, Urine, *Gas chromatography, Water analysis, Heavy metals, *Pollutant identification.
Identifiers: Gas liquid chromatography, *Biological samples, Serum, Perhalophenyl mercury, Arylating agents, Aryl mercurials, *Organomercury compounds, Electron capture detector, Detection limits, Precision, Chemical Recovery.

Inorganic mercury and organomercurials present in water, urine and serum are evaluated by gas-liquid chromatography and the use of perhalobenzenesulfinates which react with inorganic mercury to yield a perhalophenyl mercury. Best results are obtained with lithium pentafluorobenzenesulfinate as arylating agent for inorganic mercury. Recovery and precision data include: water, 70.5 percent (6.8); urine, 81.4 (10.5); serum, 51.0 (9.4). Lower detection limit of inorganic mercury, as the pentafluorophenyl analyte, is 20 ng of meliliter of sample. Optimal chromatographic results were obtained with 10 percent Dexsil-300 on Anakrom SD, 70-80 mesh, and Durapak Carbowax 400 on Porasil F. (Mortland-Battelle)
W74-05482

NITROGEN FIXATION IN A SUBARCTIC MIRE,
Kungliga Lantbrushogskolan, Uppsala (Sweden).
For primary bibliographic entry see Field 5B.
W74-05489

METAL COORDINATION COMPOUNDS OF THIABENDAZOLE,
Western Washington Research and Extension Center, Puyallup.
V. L. Miller, C. J. Gould, E. Csonka, and R. L. Jensen.
Journal of Agricultural and Food Chemistry, Vol 21, No 5, p 931-932, September/October 1973. 1 tab, 12 ref.

Descriptors: *Fungicides, *Aqueous solutions, Copper, Zinc, Cobalt, Nickel, Solubility, Synthesis, Biological properties, Bioassay, Fungi, Hydrogen ion concentration, Water quality, Spectroscopy, Pesticide toxicity, *Metals.
Identifiers: *Thiabendazole, Fusarium, Penicillium, 2-(4'-Thiazolyl)benzimidazole, Organometallics.

Several metal coordination compounds of the fungicide thiabendazole, 2-(4'-thiazolyl)benzimidazole (TBZ), were prepared and the solubilities in water and the pH of the solutions were determined. Fungicidal activity of the compounds was equal to that of TBZ against an isolate of Penicillium and of Fusarium. For analysis the compounds were hydrolyzed in 6 N HCl at steam bath temperature for 1-2 hr. TBZ was determined by absorbance of an aliquot of the digest in 0.1 N HCl measured at 302 nm. For chloride analysis, the sample was dissolved in dilute nitric acid and titrated. The approximate water solubility of the compounds was determined by machine shaking of excess compound with water at room tempe at least 4 hr. The water solubility of TBZ was determined to be 1-2 micrograms/ml. The ZN (TBZ)2C14 and CoTBZ(GLU)2 were the most soluble. The solubility of TBZHCl as TBZ was 18.2 mg/ml, and the pH was 3.3. The materials to be bioassayed were dissolved in water and the concentration was determined by spectroscopy at 302 nm in 0.1 N HCl. The control level of active ingredient of commercially formulated TBZ determined by this bioassay was 11 micrograms/ml for Penicillium and 92 micrograms/ml for Fusarium. The activity of the synthetic materials may reflect water solubility rather than greater potency. (Mortland-Battelle)
W74-05490

ADSORPTION OF HG(II) BY HYDROUS MANGANESE OXIDES,
University of Southern California, Los Angeles. Environmental Engineering Program.
R. A. Lockwood, and K. Y. Chen.
Environmental Science and Technology, Vol 7, No 11, p 1028-1034, November 1973. 10 fig, 13 ref.

Descriptors: *Mercury, *Adsorption, Manganese, *Aqueous solutions, Water pollution control, Sodium chloride, Hydrogen ion concentration, Waste water treatment, Freshwater, Broackish water, Spectrophotometry, Chlorides.
Identifiers: *Manganese oxide, Scavenging, Transport, Ionic strength, Desorption Pollutant Removal.

The adsorption of Hg(II) by hydrous manganese oxides suspended in solutions with wide ranges of pH, chloride concentration, and ionic strength was studied to evaluate the possible importance of manganese oxides in mercury scavenging in natural waters. Manganese dioxide and possibly other oxides were precipitated with the addition of MnS04 solution to KMn04 solution. Hg(II) was adsorbed rapidly when added to aged suspensions of Mn02 with low ionic strength. 0.6 M NaCl repressed adsorption below pH 9, but not above pH 10. Apparently 0.6 M NaC104 changed equilibrium values only slightly, but adsorption rates were many ornitude lower, particularly above pH 8. It is concluded that Mn02 may be important as a mercury scavenger in fresh or brackish water, either in the natural environment or in the treatment of water and wastewater. Conclusions about Hg in manganese nodules in the ocean are not justified because of the large extrapolation required between the data presented and the actual ocean concentrations of Hg(II). On the other hand, in freshwater lakes and streams, and possibly in soils, amorphous manganese oxides would be active scavengers of mercury. The actual presence of mercury in manganese nodules from deep ocean deposits may be accounted for by other mechanisms not studied in this work. (Mortland-Battelle)
W74-05491

CHEMICAL CONFIRMATION OF BHC ISOMERS: COMPARISON OF ALKALINE REACTIONS IN SOLUTION AND BY GAS CHROMATOGRAPHIC PRE-COLUMN,
Department of Agriculture, Ottawa (Ontario). Plant Products Div.
W. P. Cochrane, and R. B. Maybury.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1324-1329, November 1973. 4 fig, 2 tab, 23 ref.

Descriptors: *Gas chromatography, *Pollutant identification, *Pesticide residues, Separation techniques, Foods, Cereal crops, Feeds.
Identifiers: *BHC isomers, *Lindane, Sodium methoxide, Trichlorobenzene, Biological samples, Cleanup, Isomers, Electron capture detector, Alkaline precolumn method, Gas liquid chromatography, Sample preparation, Fat, Meat.

A rapid precedure that involves treatment with sodium methoxide (NaOMe) solution is described for the qualitative confirmation of lindane (and other BHC isomers) residues in cereal, animal feed, meat, and fat samples. Losses encountered in the evaporation and partition steps are discussed. Optimum electron capture GLC conditions, both programmed and isothermal, for the separation of the 1,3,5-, 1,2,4-, and 1,2,3-trichlorobenzene products are given. Comparison of the NaOMe solution reaction with an alkaline pre-column technique revealed that the latter saved time in the analysis of cereal, animal feed, and cheese extracts. The alkaline pre-column method did not elimenate interferences in some meat and fat samples; the NaOMe solution reaction does eliminate these interferences. A lower level of 0.01 ppm lindane in a 10-g sample can be confirmed by the procedures described. (Mortland-Battelle)

W74-05494

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF ROTENONE AND DEGUELIN IN PLANT EXTRACTS AND COMMERCIAL INSECTICIDES,
Northern Regional Research Lab., Ill.
N. E. Delfel.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1343-1349, November 1973. 2 fig, 3 tab, 16 ref.

Descriptors: *Insecticides, Vegetation, Leaves, Separation techniques, Gravimetric analysis, *Gas chromatography, *Pollutant identification.
Identifiers: Gas liquid chromatography, *Rotenone, *Deguelin, Flame ionization detector, Derris elliptica, Rotenolone, Lonchocarpus nicou, Tephrosia, vogelii, Thin layer densitometry, Reproducibility.

Retention times on 3 percent methyl silicone in glass columns at 160C were 0.85 and 1.39, respectively, for deguelin and stigmasterol acetate, the internal standard; and flame ionization detector responses were 1.00 and 1.47, respectively, compared to rotenone as 1.00 in both cases. Rotenolone, when present, interfered with the determination of deguelin. Rotenoid extracts from Derris elliptica and Lonchocarpus nicou roots lacked other interfering materials. Tephrosia vogelii leaflets contained fat-soluble contaminants that were minimized by using acetonitrile for extraction and by subsequent partitioning with hexane. When the GLC assay was applied to commercial samples, rotenone results were comparable to label values in 2 samples and rotenoid oxidation products were detected in 2 others. The precision of GLC was plus or minus 4.1 percent and the results agreed with those by thin layer densitometry (TLD) within 2.1 percent for rotenone and 2.9 percent for deguelin. A monor improvement of TLD for analysis of T. vogelii extracts is also described. In conclusion, GLC is quicker than TLD and yields more reproducible results (4 percent vs. 8 percent, respectively). The 2 methods gave comparable results on D. elliptica and L. nicou, and GLC avoided most of the bias for the TLD deguelin value in T. vogelihe GLC method has many positive attributes which favor its being considered as an alternative to the slower, more expensive gravimetric method for rotenone in industrial quality control. (Mortland-Battelle)
W74-05495

SEMIAUTOMATED METHOD FOR MORE PRECISE AND SENSITIVE DETERMINATION OF NONPOLAR ANTICHOLINESTERASE INSECTICIDES WITH TECHNICON MODULES,
Ciba-Geigy Ltd., Basel (Switzerland). Agrochemical Div.
G. Voss.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1506-1507, November 1973. 5 fig, 6 ref.

Descriptors: *Insecticides, *Automation, *Gas chromatography, *Methodology, Adsorption, Flow, *Pollutant identification, Organophosphorus pesticides.
Identifiers: *Anticholinesterases, AutoAnalyzer, Chlorfenvinphos, Cholinesterase, Sensitivity, Reproducibility.

Problems of adsorption of relatively nonpolar anticholinesterase insecticides to the pump tubing of automated flow systems have been noted and described by several authors. The problem has now been eliminated by not pumping the sample solutions directly; instead they are more concentrated and are manually injected into a special flowcell-type injection chamber just downstream from the proportioning pump. In the original procedure the insecticide solution (0.8 ml/min) was pumped from the sampler (20 samples/hr, 1 min sample aspiration followed by a wash period of 2 min) and mixed with an equal volume of buffered cholinesterase solution. The altered portion of the manifold, however, in addition to the usual air pump tubing, requires only one pump tube (1.6 ml/min) through which the enzyme working solution (2-fold dilution) flows into an all-glass and one-piece injection cell with a volume of ca 0.8-1.0 ml. The solution passing through the cell is continuously stirred by means of a magnetic flea. Methanolic insecticide solutions are then injected into the cell through a silicone rubber sng a microsyringe. Original AutoAnalyzer recordings obtained with the organophosphate chlorfenvinphos and peacock plasma cholinesterase are presented for both systems. The results demonstrate the advantages of injecting nonpolar compounds into an aqueous flow system. While the injections are performed manually in the present system, the potential for full automation awaits the inclusion of an automated injection sampler, for example, the Hewlett-Packard Model 7670A automatic sampler. (Mortland-Battelle)
W74-05496

ULTRASONIC SOLUBILIZATION TECHNIQUE FOR USE IN COULOMETRY,
Wagner Coll. Science Center, Staten Island, N.Y.
W. P. Ferren, and W. M. Fortinash.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1514-1515, November 1973. 1 tab, 4 ref.

Descriptors: *Chlorides, *Analytical techniques, *Pesticides, Organic compounds, Methodology.
Identifiers: *Coulometry, *Ultrasonic solubilization, Precision, p-Chlorobenzoic acid.

An ultrasonic solubilization technique has been developed which is useful as a first step in the coulometric determination of the chloride content of crystalline organic compounds such as p-chlorobenzoic acid. p-Chlorobenzoic acid was used as the test compound because it represents a crystalline powder substance requiring very efficient agitation to achieve the necessary intimate contact with the sodium biphenyl reagent. Using p-chlorobenzoic acid as the standard, it was found that adding hydrogen peroxide and evaporating by heat yielded errors as much as -10 percent. The use of ceric ion to destroy hydrogen peroxide prior to coulometric measurements reduced these errors to about -3 percent. Subsequently, the elimination of hydrogen peroxide in favor of a stream of oxygen gas improved the accuracy of the method to the point where the average value of 10 determinations was 22.58 percent chloride compared to the theoretical value of 22.65 percent cride. It was possible to determine 4 micrograms chloride (as present in p-chlorobenzoic acid) with a linear relationship between read-out and chloride content for p-chlorobenzoic acid in the sample range 0.0 to 2.0 mg. The percentage of chloride in p-chlorobenzoic acid was determined with an absolute error of -0.07 percent or a relative error of -0.3 percent. The standard deviation was 0.06, which yields a 95 percent confidence interval of plus or minus 0.04 percent. This confidence interval applies within the limits of detection. (Mortland-Battelle)
W74-05497

EXPERIMENTAL APPROACHES TO LIMNOLOGY - AN OVERVIEW,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler.
Journal of the Fisheries Research Board of Canada, Vol 30, No 10, p 1490-1413, October 1973. 1 tab, 26 ref.

Descriptors: *Limnology, *Lakes, *Nutrients, *Methodology, Eutrophication, Carbon, Gas chromatography, Diffusion, Radioactivity techniques, Primary productivity, Bioassay, Model studies, Bicarbonates, Water temperature, Hydrogen ion concentration, Water quality, Volumetric analysis, Plankton, Algae, Chlorophyll, Phosphates, Fertilization, Phosphorus, Carbon, Absorption.
Identifiers: Dissolved inorganic carbon, ATP, Experimental Lakes.

After 4 years of searching for methods to describe and interpret changes in lakes of the Experimental Lakes Area and considerable laboratory work related to critical problems in freshwater nutrient dynamics, several papers describing the work have been prepared. This paper attempts to summarize these individual contributions. One problem encountered was lack of a reliable method for measuring dissolved inorganic carbon. A modified gas chromatographic technique was devised to overcome this shortcoming. A simple method for measuring live microplankton biomass was also needed. This need may be met through ATP measurements, although several possible problem areas must be thoroughly tested. A serious problem still remaining is the estimation of true phosphate concentrations. Standard acid molybdate methods give too high results in most waters and bioassay or Sephadex techniques are time-consuming and require highly experienced personnel. Several problems with various physical methods (diffusion gas exchange, dye diffusion, radon techniques) are also discussed as are those with in situ biological methods. Fallacies in systems modelling approaches to nutrient and productivity studies are pointed out. It is concluded that from a purely scientific point of view, the most important area in limnological research remains the construction and thorough testing of a sound methodology, designed to illuminate ecosystem problems rather than just to describe them. (Mortland-Battelle)
W74-05498

THIN-LAYER CHROMATOGRAPHY OF METAL CHELATES. PART II. AN EXTENDED THEORY AND ITS TESTING ON METAL DITHIZONATES AND METAL DIETHYLDITHIOCARBAMATES,
A. Galik.
Analytica Chimica Acta, Vol 67, No 2, p 357-376, December 1973. 12 fig, 3 tab, 25 ref.

Descriptors: *Aqueous solutions, *Heavy metals, *Mathematical models, Mercury, Copper, Nickel, Cobalt, Lead, Cadmium, Zinc, Iron, Humidity, Temperature, Water analysis, Solvents, Methodology, Equations, *Chromatography.
Identifiers: *Metal Chelates, *Organic solvents, *Thin layer chromatography, Bismuth, Indium, Antimony, Dithizonates, Diethyldithiocarbamates, Sample preparation, Validity.

The extension of an earlier mathematical model attempted to explain the effect of solvent composition a humidity on the thin-layer chromatographic (tlc) behavior of metal pyridylazonaphtholates. The purpose of the study was to make the model capable of predicting more phenomena and to provide a basis for further research leading to a better understanding of the chromatography of metal chelates. Review and study of the model led to the derivation of equations from which it was concluded that the position of the spot of the solute on the chromatogram may be influenced by the choice of the polar component of the solvent mixture, by the concentration of this component in this mixture, and by air humidity and temperature. The validity of these conclusions was shown by studying the tlc behavior of metal (Hg, Bi, Cu, Ni, Co, Pb, Cd, Zn, In, Sb, Fe) dithizonates and diethyldithiocarbamates on Silufol. A comparison of the mobilities of these metal chelates, as well as of those of 8-hydroxyquinoline, salicyladoxime and benzoylacetone, with their extraction constants showed a mutual correlation between these properties. (Little-Battelle)
W74-05500

AN IMPROVED ION-EXCHANGE TECHNIQUE FOR THE CONCENTRATION OF MANGANESE FROM SEA WATER,
Skidaway Inst. of Oceanography, Savannah, Ga.
R. G. Smith, Jr.

Skidaway Institute of Oceanography Annual Progress Report (EPA Project No R-800372), Appendix E, p 236-242, January 1974. 1 tab, 10 ref.

Descriptors: *Chemical analysis, *Manganese, *Sea water, *Ion exchange, Analytical techniques, Flame photometry, Pollutant identification.

In analysis of Mn in seawater, a batch technique is used for the concentration of Mn using Chelex-100. The technique alleviates difficulties in the column technique caused by swelling and contraction properties of the resin. The method yields quantitative recovery with a variation in efficiency of plus or minus 0.6%. (See also W74-05501) (Knapp-USGS)
W74-05506

DETERMINATION OF THE RATE OF TRIPOLY- AND PYRO-PHOSPHATE HYDROLYSIS IN SEDIMENTS,
Missouri Univ., Columbia. Dept. of Agronomy.
R. W. Blanchar, and D. Riego.
Available from National Technical Information Service as PB-229 837 $6.25 in paper copy, $1.45 in microfiche. Missouri Water Resources Center, Columbia, Completion Report, January 1974. 52 p, 18 fig, 2 tab, 34 ref. OWRR A-059-MO(1). 14-01-0001-3825.

Descriptors: *Hydrolysis, *Sediments, *Missouri, Kinetics, *Phosphates, Chemical precipitation, Chemical reactions, Pollutant identification.
Identifiers: *Polyphosphates, *Pyrophosphates.

The rate of hydrolysis of tripolyphosphate (TPP) and pyrophosphate (PP) in sediments was determined. The sediments were collected from Cape Fair, Thomas Hill Lake, Flat Branch Creek, and Maries River. The rate of hydrolysis of TPP and PP was similar to that predicted from first order kinetics. Half lives for the hydrolysis of TPP and PP were 1.6 to 2.6 and 6.7 to 27.4 days, respectively. The influence of temperature, biological activity, and pH on the rate of TPP and PP hydrolysis was investigated using Flat Branch Creek sediment. The rate of TPP and PP hydrolysis increased with increasing temperature. The activation energy was 5415 cal/mole for TPP and 10,412 cal/mole for PP. TPP and PP were hydroloyzed faster in non-sterile sediment than in sediment which had been sterilized. The half life for TPP hydrolysis was 1.76 days at pH 5, 1.61 days at pH 7, and 2.16 days at pH 9. PP hydrolysis was increased as pH was increased from 5 to 7 to 9 as indicated by half lives of 13.7, 10.0 and 7.3 days, respectively. When TPP was added to the sediment as a Ca5 (P3010)2 precipitate the rate of hydrolysis was slower (1/2life = 2.79 days) than when TPP was added as a solution (1/2life = 1.68 days).
W74-05542

EVOLUTION OF THE ISOTOPIC COMPOSITION OF LEAD IN ANCIENT MARINE BASINS (K VOPROSU OB EVOLYUTSII IZOTOPNOGO SOSTAVA SVINTSA V DREVNIKH MORSKIKH BASSEYNAKH),
Akademiya Nauk SSSR, Leningrad. Institut Geologii i Geokhronologii Dokembriya.
For primary bibliographic entry see Field 2F.
W74-05559

RESULTS OF MONITORING FOR TRITIUM INCORPORATION AT THE KARLSRUHE NUCLEAR RESEARCH CENTER IN 1971 AND 1972, (ERGEBNISSE DER TRITIUM-INKORPORATIONSUBERWACHUNG IM KERNFORSCHUNGSZENTRUM KARLSRUHE IN DEN JAHREN, 1971-1972),
Kernforschungszentrum, Karlsruhe (West Germany).
H. Schieferdecker.
Available from NTIS, Springfield, Va., as Rept. No. KFK-EXT-23/73-1; $3.00 per copy, $1.45 microfiche. Externer Bericht 23/73-1, April 1973. 12 p, 5 tab. English summary.

Descriptors: *Monitoring, *Tritium, *Assay, *Measurement, Safety, Regulation, Standards, Control, Public health, Nuclear powerplants, Effluent, Fuels.
Identifiers: *Germany(Karlsruhe), Fuel reprocessing.

The results of the monitoring activities for tritium incorporation at the Karlsruhe Nuclear Research Center in 1971 and 1972 show that there have been no increases in incorporations relative to previous years, despite the increasing work load. In no case was the maximum permissible dose exceeded. The maximum dose due to H-3 incorporation was between 50 and 500 mrem/a. (Houser-ORNL)
W74-05613

DETERMINATION OF SULFATE USING FERRIC ION-SELECTIVE ELECTRODE,
R. J. Jasinski, and I. Trachtenberg.
Available from NTIS as PB-220 443, $3.00 paper copy; $1.45 microfiche. Department of the Interior, Office of the Solicitor, Patent Application Serial Number 350,444, April 1973. 9 p, 2 fig.

Descriptors: *Patents, Chemical reactions, Sea water, Industrial wastes, Brackish water, Pollution abatement, Water quality control, *Electrodes, Sulfates, Analytical techniques, *Pollutant identification, Measurement, Aqueous solutions.
Identifiers: *Sulfate ions, Ferric ions, *Sensors, *Ion selective electrodes.

Detection and measurement of the concentration of various ions in aqueous solution by means of ion selective electrodes finds utility in a variety of environmental and industrial applications. Analytical potentiometry, and ion selective electrodes or sensors therefore, can be employed for control of water quality, to obtain optimum yields in chemical processes, etc. Sulfate ion concentration in aqueous solution is determined by initially adding a known concentration of ferric ion to the solution, and adjusting the pH of the solution to a suitable value, whereby ferric ion is complexed by the sulfate ion. The activity of the remaining, uncomplexed ferric ion is then measured by means of a ferric ion-selective electrode. (Sinha - OEIS)
W74-05693

CHARACTERISTICS OF CONDENSER WATER DISCHARGE ON THE SEA SURFACE (CORRELATION OF FIELD OBSERVATIONS WITH THEORY),
Massachusetts Inst. of Tech., Cambridge.
S. C. Doret, D. R. F. Harleman, A. T. Ippen, and B. R. Pearce.
Available from NTIS as COM 73-11294, $4.50 in paper copy, $1.45 microfiche. Sea Grant Publication Report No. MITSG 73-12, Index No. 73-312-Ccs, June 1973. 124 p, 35 fig, 3 tab, 9 ref, 22 plates. NOAA NG-43-72.

Descriptors: Massachusetts, *Electric powerplants, *Heated water, *Nuclear powerplants, Measurement, *Thermal pollution.
Identifiers: Coastal waters, Pilgrim Nuclear Power Station(Mass), Condenser water, Sea surface, Temperature distributions, Waste heat, Plumes.

Field measurements of the condenser water discharge plume at the Pilgrim Nuclear Power Station were conducted during three survey periods between January and April 1973. Horizontal temperature profiles of the plume were obtained for two water depths. Vertical temperature profiles were obtained in the far field to establish the ambient water conditions for the various survey periods. Plume centerline temperature reduction versus distance and surface isotherm areas were determined from the field data. Analytical predictions for field results of both centerline temperature reduction versus distance and surface isotherm areas show good agreement when discharge conditions are relatively constant for a period of an hour or more. Theoretical predictions of center-line temperature reduction versus distance and surface isotherm areas for the mid tide phase when the jet characteristics are changing most rapidly do not agree with the field results. An attempt to reduce the unsteadiness of the field conditions by time weighted average (1/2 tidal cycle) and comparison to the time weighted average of the theory was made for the centerline temperature reduction versus distance field results. The results were reasonably successful but the unsteady influence of the mid tide phase could not be completely eliminated by this method. Sensitivity of the analytical model to cross currents and heat loss coefficient were determined to be minimal. Changes in channel geometry at the mouth of the discharge channel occurred due to winter storms. Since the discharge channel geometry is not known exactly, a precise comparison with the analytical model is difficult particularly at low tide when the effects of changes in the exit section are most important. Winter weather conditions at the site prohibited continuous ambient current measurement by the power company. (Sinha - OEIS)
W74-05700

HANDBOOK FOR MONITORING INDUSTRIAL WASTEWATER.
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
Environmental Protection Agency Office of Technology Transfer Handbook, August 1973. 175 p, 59 fig, 24 tab.

Descriptors: *Monitoring, *Industrial wastes, *Water pollution control, Instrumentation, Water analysis, Sampling, Data collections, Automation, Municipal wastes.
Identifiers: *Combined treatment.

Information is presented for use and reference in planning, executing and continuing a program of industrial waste monitoring. Philosophy of monitoring needs, planning, sampling, measuring, and analysis are presented for familiarization by industrial plant managers. Sufficient detail is given for those who wish to explore more deeply some of the practical and theoretical aspects of monitoring programs. A logical procedure is suggested and direction given for industrial plant waste control programs. Automated sampling, measuring, and analytical devices are described and methods of use outlined. Manual procedures and non-automated methods are also presented. Use of the collected data is discussed. Special considerations for industrial-municipal joint treatment are described. Numerous references are included for the reader who needs more detailed information on special tests, equipment or procedures necessary for the successful conduct of a monitoring program. (Knapp-USGS)
W74-05862

OXYGEN ANALYZER,
Lowrance Electronics, Inc., Tulsa, Okla. (Assignee).
H. A. Cramer.
U.S. Patent No. 3,782,170, 3p, 3 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 918, No 1, p 179, January 1, 1974.

Descriptors: *Patents, *Dissolved oxygen, *Instrumentation, Measurement, Water pollution, *Oxygen, Electrodes, Monitoring, Pollutant identification.

A small instrument can be inserted into a body of water or other liquid to make a determination of the concentration of free dissolved oxygen in the water. It comprises a cylindrical tube with an end plate and a permanent magnet placed coaxial with the tube with its south pole in contact with the end plate. The length of the magnet is approximately one half or less the length of the cylindrical tube. A pair of electrodes are positioned in the wall of the

tube, approximately at the middle of the length of the tube. A disc having a number of holes to permit passage of water axially along the inside of the tube, is mounted across the cross section of the tube, closely spaced from the electrodes. When a battery is connected to the electrodes a current will flow. Negative ions will be deflected by the magnetic field toward the magnet and so will be intercepted by the grid. The magnitude of this current can be determined by a meter which is connected in the lead from the grid to the positive pole of the battery. (Sinha-OEIS)
W74-05909

ATP POOLS IN ACTIVATED SLUDGE,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W74-05914

MAJOR ELEMENT GEOCHEMISTRY OF LAKE POWELL,
Dartmouth Coll., Hanover, N.H. Dept. of Earth Sciences.
For primary bibliographic entry see Field 2H.
W74-05923

WATER RESOURCES DATA FOR NEW YORK, 1972: PART 2. WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 2E.
W74-05931

5B. Sources Of Pollution

NITROGEN UPTAKE EFFICIENCY BY FOUR PLANT SPECIES IN THE FIELD AND GROWTH CHAMBER,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
J. H. Edwards, D. D. Warncke, S. A. Barber, and D. W. Nelson.
Available from the National Technical Information Service as PB-229 638, $6.00 in paper copy, $1.45 in microfiche. Technical Report No. 40, 1973. 48 p, 2 fig, 25 tab, 7 ref. OWRR B-026-IND(3).

Descriptors: *Groundwater, *Nitrates, *Farm management, *Root development, *Deep percolation, Crop production, Planting management, Soil management, Underground field crops, Nitrogen compounds, Ammonium salts, Root systems, Absorption, Soil-water-plant relationships, *Path of pollutants, Water pollution control.
Identifiers: Ammonium-nitrate ratios, Shoot-root ratio, Uptake coefficient.

Cropping patterns were studied to ascertain how most effectively to reduce the level of nitrate in the soil to lessen the amount subject to leaching and moving into drainage water. Sorghum and sudax grown in the field removed greater amounts of nitrogen than corn or wheat. In corn, the nitrogen flux into a root reached a maximum by 18 to 24 days and decreased rapidly to tasselling. The amount of nitrogen leaching from the soil can be reduced if added only in the ammonium form and maintained as ammonium by imbibition. Comparisons made between ammonium and nitrate in nutrient cultures for corn showed that the two sources of N were absorbed at equal rates at all stages of plant growth. The research showed that the plant roots of a number of common crop species had the ability to reduce the nitrate in solution to very low levels. The level found in the soil after cropping was one to two orders of magnitude larger than this apparently because the nitrate must move to the root before it is positionally available for absorption. Cultural practices that increase root density, particularly in the subsoil should cause more efficient nitrogen use.
W74-05404

THE MICROBIOLOGY OF ACID MINE WATER TREATMENT IN PACKED BED COLUMNS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-05409

MASS TRANSFER IN HETEROGENEOUS SYSTEMS AND VELOCITY AND GAS ABSORPTION STUDIES FOR SINGLE BUBBLES,
Iowa State Univ., Ames. Dept. of Chemical Engineering.
A. Mukerjee.
Available from the National Technical Information Service as PB-229 560, $17.50 in paper copy, $1.45 in microfiche. Ph D Thesis, 1973. 263 p, 57 fig, 12 tab, 77 ref. OWRR B-030-IA(1).

Descriptors: *Mass transfer, *Surfactants, *Bacteria, *Bubbles, Aeration, Dissolved oxygen, Reaeration, Oxidation, Fermentation, Water pollution effects, Water pollution treatment.

The effects of surface active materials on gas absorption were studied in reactive and nonreactive systems. Bacterial cell particles including Acetobacter rancens, Acetobacter suboxydans, and Acetobacter xylinum, increase the mass transfer rate of oxygen in the oxidation of glucose to gluconic acid at pH 6.12. Direct uptake of oxygen by the cells, decrease in the film thickness, and local surface turbulence were demonstrated. The presence of surfactants (1 ppm to 500 ppm) retards the rise velocity 40% for bubbles 0.31 cm diameter and 24% for bubbles 0.49 cm to 0.58 cm diameter. The concentrated interfacial layer of surfactant molecules shifts the point of separation, increases the drag force and imparts a rigid sphere behavior. Rise velocity of soluble bubbles in general is retarded by the simultaneous mass transfer process. For the range of bubble sizes examined, the rate of mass transfer from smaller bubbles is higher. A differential equation was derived to describe the phenomenon of a dissolving oxygen bubble rising in a frozen lake. Parameters such as lake depth, temperature profile, BOD, and pollutant concentration are considered in dimensionless form. Numerical solutions indicate a striking difference in gas absorption due to the effect of surface active pollutants and suggests the feasibility of artificially oxygenating frozen lakes and streams to raise the DO concentration in the winter months. (Knapp-USGS)
W74-05413

SOURCES AND MOVEMENTS OF WATER--AN INTERIM REPORT.
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 2L.
W74-05415

STAFF REPORT ON COAL GASIFICATION: PROCESSES AND EFFECTS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
J. P. Chasse.
Manuscript, October 1973. 28 p, 5 fig, 1 tab, 12 ref.

Descriptors: *Hydrate processes, *Thermal pollution, Chemical reactions, Coals, Carbon, Gases, Industrial production, *Fossil fuels, Nuclear powerplants, Thermal powerplants, Steam turbines, Electric power production, Environmental effects.
Identifiers: *Coal gasification.

Coal gasification offers enormous potential both for alleviating projected shortages of natural gas for consumer use and for fueling advanced-cycle electric generating units. The first circumstance has already achieved limited commercial application and is receiving significant research effort to develop new processes. The latter situation, while requiring a less sophisticated gasification process, is at a lesser stage of development. This is primarily due to a lack of technology relative to the integrated gasification/power generation system. The projected commercial size installations are 250 x 1,000,000 scf/day for high-Btu pipeline gas (950 Btu/scf) and 700 x 1,000,000 scf/day for low-Btu fuel gas (175 Btu/scf). On that scale, pipeline gas production is a more potential threat to the environment, primarily due to its lower anticipated efficiency: 65 percent versus 82 percent for the fuel gas plant. The substitute natural gas plant will consume up to 25,000 tons of coal and 9 million gallons of water per day. In doing so it will generate up to 250 tons of sulfur and 5,000 tons of ash per day. The fuel gasification/power generation system, however, promises to be less polluting than the alternative fossil-fuel steam plant. Comparison of the two coal gasification processes is, of course, artificial being dependent on the actual scale of the operations. Nevertheless, when compared with the alternative fuel sources, high-Btu gas will present more difficult problems. A major advantage of the gasification/generation system will be the potential for reduced thermal pollution. If thermal efficiencies of 82, 85, and 88 percent are achieved for the first, second, and third-generation gasification processes, the thermal heat rejection for the COGAS system can be estimated. The overall efficiencies include a 2 percent loss in the generator and a 2 percent pumping load. Liquid thermal pollution for a combined-cycle operation would be considerably less than for a conventional electric generating plant. Problems of make-up water supply would be correspondingly diminished.
W74-05416

ASSESSMENT OF THE LOSS OF RADIOACTIVE ISOTOPES FROM WASTE SOLIDS TO THE ENVIRONMENT. PART 1: BACKGROUND AND THEORY,
Oak Ridge National Lab.
H. W. Godbee, and D. S. Joy.
Available from NTIS, Springfield, Va., as ORNL-TM-4333, $5.45 per copy, $1.45 microfiche. Report No. ORNL-TM-4333, February 1974. 65 p, 5 fig, 7 tab, 34 ref.

Descriptors: *Nuclear wastes, *Waste treatment, *Waste disposal, Environment, Radioisotopes, *Solid wastes, Leaching, Path of pollutants, Water pollution, Soil contamination, Degradation(Decomposition), Assay, Safety, Public health.

Assessments of the amounts of radioactivity from waste solids that enter the environment are needed for engineering, economic, and safety evaluations of proposed waste treatment, storage, transport, and disposal systems. This report presents several theoretical expressions based on mass transport phenomena that relate the radioactivity escaping from such solids to diffusion, dissolution processes, surface conditions, and radioactive decay. Representative available data for radioactive waste solids incorporated in cement, asphalt, ceramic and glass media are analyzed using the theoretical expressions presented. These analyses show that an expression taking into account diffusion and concentration-dependent dissolution gives good agreement with the data for most of the products considered. Once determined, parameters can be used to compare various waste products and to estimate releases from these products, in particular, long-term releases. (Houser-ORNL)
W74-05419

ASSESSMENT OF POTENTIAL RADIOOLOGICAL HEALTH EFFECTS FROM RANDON IN NATURAL GAS,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05420

DOSE AND RISK CONSIDERATIONS FOR THE RELEASE OF I-131 AT SPECIAL SITES,
Kernforschungszentrum, Karlsruhe (West Germany). Institut fuer Neutronenphysik und Reaktortechnik.
For primary bibliographic entry see Field 5C.
W74-05421

A STOCHASTIC STUDY ON THE CONCENTRATION PROCESS OF RADIOACTIVE SUBSTANCES TO AQUATIC ORGANISMS,
Kyoto Univ. (Japan). Dept. of Sanitary Engineering.
I. Aoyama, and Y. Inoue.
Health Physics, Vol 26, No 2, p 191-198, Feb 1974. 9 fig, 7 tab, 9 ref.

Descriptors: *Water pollution sources, *Radioisotopes, *Radiation effects, *Aquatic microorganisms, Aquatic environment, Equation, Mathematics, *Stochastic processes, Markov processes, Time series analysis, Operations research, Mathematical studies, Model studies, Water pollution effects.

In a previous paper, the authors attempted to expalin the dynamic concentration process of radioactive substances in organisms using a Markov process. The phenomenon was well depicted when the concentration of the radioactivity in the environmental water was kept constant. In this paper, an attempt is made to explain the radioactive contamination of organisms as a time series using a birth-death process, which is one of the stochastic processes. The existing probability Pi(t) that the concentration step of organisms is in the concentration step 'i' at an arbitrary time t is given as follows: P sub i (t) equals (m(t) exp i/i factorial)-all raised to the minus m(t) power, where m(t) is a mean concentration step obtained from an exponential model. Using this analytical method, it is found that the theory can be applied generally to cases in which the concentration in the environmental water varies with time t and that the concentration distribution follows the Poisson distribution whose parameter m(t) is equal to the mean value of the concentration steps. (Houser-ORNL)
W74-05429

ENVIRONMENTAL RADIATION SURVEILLANCE OF THE OYSTER CREEK NUCLEAR GENERATING STATION.
New Jersey Dept. of Environmental Protection, Trenton. Div. of Environmental Quality.
For primary bibliographic entry see Field 5A.
W74-05430

RESPONSE OF RIVER WATER TO BIOCHEMICALLY DEGRADABLE SUBSTANCES IN PULP MILL WASTE WATER (ODEZVA REKY NA BIOCHEMICKY ODBOURATELNE LATKY V ODPADNICH VODACH Z CELULOZEK),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
J. Schmied.
Papir a Celuloza, Vol 28, No 6, p 117-119, 1973. 1 tab, 4 fig, 6 ref.

Descriptors: *Pulp wastes, *Dissolved oxygen, Water pollution sources, *Oxygen sag, *Mathematical models, *Simulation analysis, Organic loading, Equations, Aeration, Industrial wastes, Pulp and paper industry, Kinetics, *Path of pollutants.
Identifiers: Site selection, Streeter-Phelps equation.

Biodegradable matter introduced into a stream causes depletion of dissolved oxygen. The depletion rate and the re-aeration rate can be determined, and the reaction rate constants can be used to assess the effect of organic pollutants on river water quality. A methematical model based on the Streeter-Phelps equation was developed, which permits the dissolved oxygen level to be determined as function of pollution load and time. Illustrative examples of calculations are given. Such calculations should always be included in pulp mill site selection procedures, so as to minimize effluent damage to streams. (Trubacek-IPC)
W74-05431

REDUCTION OF POLLUTANTS IN EFFLUENTS (UMEN'SHENIE POSTUPAYUSHCHIKH V STOK ZAGRYAZNENII),
G. E. Gal'per, M. V. Nikolaeva, R. E. Smirnov, and Ya. V. Nikitin.
Bumazhnaya Promyshlennost', No 6, p 8, June 1973. 2 tab, 1 fig.

Descriptors: *Pulp wastes, *Sulfite liquors, *Effluents, *Organic loading, *Suspended solids, Dissolved solids, Chemical oxygen demand, Effluents, Foreign research, Water pollution sources, Pulp and paper industry.
Identifiers: Sulfite pulping, Multistage pulping, Pulp yield, Spent sulfite liquor, Spent pulping liquors, Soviet Union.

Laboratory comparisons of spent sulfite pulping liquors (SSL) from a two-stage bisulfite-sulfite process vs. a conventional single-stage cook indicated that the two-stage SSL contained much lower concentrations of solids, organic loading, COD, and reducing compounds than the single-stage SSL. In addition, the two-stage pulp was brighter, stronger, and obtained in higher yields (55% compared to 50% for conventional sulfite pulp). (Stapinski-IPC)
W74-05432

CONVERSION OF SOME ORGANOPHOSPHORUS INSECTICIDES ON ADSORBING SURFACES AS AFFECTED BY FORMULATION,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
U. Mingelgrin, and B. Yaron.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 5, p 285-290, November 1973. 1 fig, 3 tab, 4 ref.

Descriptors: *Organophosphorus pesticides, *Adsorption, Formulation, *Pesticide kinetics, *Triazine pesticides, Aqueous solutions, Degradation(Decomposition), Calcium, Bentonite, Kaolinite, Peat, Ultraviolet radiation, *Gas chromatography, Centrifugation, Acaricides, Insecticides, Phosphothioate pesticides, Persistence.
Identifiers: Flame ionization gas chromatography, *Adsorbents, Pirimiphos-ethyl, Pirimiphos-methyl, Menazon, Saphizon D.P., Gas liquid chromatography, Metabolites.

This work was designed to investigate the effect of the manufacturers' formulations upon the behavior of Pirimiphos-ethyl and methyl and Menazon in the presence of natural adsorbents. Sixteen ppm active ingredient solutions of Pirimiphos-ethyl; Pirimiphos-methyl; JF2765 (Pirimiphos-ethyl emulsifiable concentrate); JF2764 (Pirimiphos-methyl emulsifiable concentrate); Menazon; and Saphizon D.P. (formulated Menazon) in 0.4 percent W.W. acetone in water were prepared. The above solutions were shaken with Ca-bentonite, Ca-kaolinite and Ca-peat (pH 5.5) with the ratio of 100:1 solution:solid, for 72 hours. Samples of the suspensions thus formed were taken at 0.5, 2, 5, 24 and 72 hours. The suspensions were centrifuged at 5000 rpm for 20 min and the supernatant was separated from the precipitate. After 5 hours and 72 hours, in the case of Pirimiphos-ethyl, Pirimiphos-methyl and their formulations, the precipitate was dried at room temperature overnight, and then extracted with hexane. UV spectra and GLC were taken from both the supernatant and the hexane extracts. Two interesting facts stand out from the results. Firstly, the unusual relatively high adsorption of Pirimiphos-ethyl upon Ca-kaolinite. Secondly, it seems that the adsorption of all pesticides is only slightly influenced the presence of the formulants. Even this preliminary data using arbitrary formulations, indicate the potential stored in the use of formulants for the purpose of affecting the chemical and biological behavior of pesticides after application. (Mortland-Battelle)
W74-05435

FLOCCULATION OF SUSPENDED SEDIMENT IN THE SEA,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
K. Kranck.
Nature, Vol 246, No 5432, p 348-350, December 7, 1973. 3 fig, 17 ref.

Descriptors: *Sediments, *Sea water, *Flocculation, Inorganic compounds, Suspended solids, Particle size, Salinity, Water temperature, Mineralogy, Current, Turbidity, Analytical techniques, Straits, Inlets(Waterways), Bays, *Canada.
Identifiers: Particle concentration, Sample preservation, *Flocs(Inorganic), Fate of pollutants, Coulter Counter.

To determine the nature and mode of formation of inorganic flocs, the concentration, grain size and general nature of the suspended particulate matter in over 500 samples from a variety of coastal environments have been studied. The samples were stored cold and dark and analyzed as soon as possible but always within a few days of collection. An inverted phase contrast microscope was used for qualitative identification of the particulate matter. The size and concentration of particles between about 1 and 100 microns were measured with a model T Coulter Counter and the results plotted as particle spectra showing the equivalent spherical diameter of the particle volume relative to concentration in parts per million. Flocs were observed in all samples and formed the majority of particles in samples from highly turbulent areas, and from near the bottom in regions of muddy sediment. The samples from these waters, high in inorganic sediment when analyzed by Coulter Counter, were characterized by regular, almost symmetrical, broad distribution with well developed modes. Total particle concentrations in the flocculated samples varied from 0.5 to 20 p.p.m and modes usually ranged between 6 and 50 microns. There was no relationship between the mode size and the concentration of particulate matter, nor did any difference in concentration of particulate matter, nor did any difference in mineralogical composition between the samples or in the salinity and temperature of the seawater, seem to have affected the flocculation process. A distinct relationship was noted between mode size and current speed of the water at the place of collection. (Mortland-Battelle)
W74-05441

THE PRODUCTION OF PARTICLES IN THE SURFACE WATERS OF THE OCEAN WITH PARTICULAR REFERENCE TO THE SARGASSO SEA,
Bedford Inst., Dartmouth (Nova Scotia).
R. W. Sheldon, W. H. Sutcliffe, Jr., and A. Prakash.
Limnology and Oceanography, Vol 18, No 5, p 719-733, September 1973. 9 fig, 1 tab, 38 ref.

Descriptors: *Sea water, Surface waters, *Food chains, *Primary productivity, Ecosystems, Radioactivity techniques, *Particle size, Growth rates, Water sampling, Diurnal, Water temperature, Oceans, Incubation, Diatoms, Protozoa, Zooplankton, Copepods, Marine fish, Marine animals, Marine bacteria.
Identifiers: *Sargasso Sea, ATP, Particle concentration, Coulter Counter, Flagellates.

A series of observations and experiments have shown that it is possible to increase our un-

derstanding of marine production simply by looking at particle formation. Particle size and concentration were measured with a model T Coulter counter. Many of the observations standardized on a particle size range from 1 micron to 100 microns. This includes most of the particles likely to be involved in primary production. The amount of living material was estimated from measurements of the adenosine triphosphate (ATP) concentration of the particulate material. Particle growth was measured by incubating sea water samples in bottles, the particle concentration (volume and ATP) being measured before and after incubation. The samples were collected at a depth of 1 m with a simple float and bottle sampler. In the surface waters of the ocean particle production and consumption are in balance. The structure of the pelagic food chain and the morphological limitations dictated by the environment are such that, in general, large particles have to consume smaller ones. If the large particles are removed the small particles cannot be consumed and their production rate can be measured. A state of exponential growth seems to be normal. The rate of production, as revealed by small particle growth following predation release, is much greater than the apparent rate of primary production indicated by radiocarbon uptake. (Mortland-Battelle)
W74-05453

TEMPORAL AND DEPTH STUDY OF ALKALINE EARTH CHLORINITY RATIOS IN SEAWATER AT A SINGLE STATION SOUTH OF PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Marine Sciences.
D. K. Atwood, P. N. Froelich, and W. F. Kinard.
Limnology and Oceanography, Vol 18, No 5, p 771-783, September 1973. 1 fig, 7 tab, 29 ref.

Descriptors: *Salinity, Calcium, Magnesium, Strontium, *Temporal distribution, Depth, *Sea water, Distribution patterns, Surface waters, Volumetric analysis, *Puerto Rico, *Alkaline earth metals.
Identifiers: *Chlorinity ratios, Atomic absorption spectrophotometry, EDTA.

Results of an 11-month study of calcium, magnesium, and strontium chlorinity ratios at a single station south of Puerto Rico are reported for depths down to 2,500 m. Samples were filtered through 0.45-micron Millipore filters and stored in high density polyethylene bottles at 2 C until analysis. Salinities were determined to plus or minus 0.01 per thousand with an induction salinometer. Strontium was determined by atomic absorption spectroscopy with a spectrophotometer. Each sample was analyzed twice; once directly and once with a 10 ppm Sr spike added as an internal standard. Calcium was determined by first precipitating magnesium as Mg(OH)2 by adjusting the pH to 12 with NaOH solution, then determining the combined calcium and strontium by titration with ethylene diamine tetracetic acid (EDTA), and subtracting the concentration of strontium. Magnesium was determined by first determining the total concentration of calcium, strontium, and magnesium and subtracting the concentration of calcium and strontium. This was done by titrating with di-Na-EDTA at pH 10 using Eriochrome Black T as an indicator. No temporal variations for any of these ratios were apparent within the precision of the analytical techniques used; however, careful evaluation of the variation in Sr:Cl per thousand must await more precise analysis. There was some indication that Ca:Cl per thousand was lower in surface and near surface waters than below 500 m. Conversely, there was evidence that the Mg:Cl per thousand was higher in upper waters than below 500 m. (Mortland-Battelle)
W74-05457

THE PERSISTENCE AND MOVEMENT OF PICLORAM AND 2,4,5-T IN SOILS,
North Carolina State Univ., Raleigh. Pesticide Residue Research Lab.
J. F. Lutz, G. E. Byers, and T. J. Sheets.
Journal of Environmental Quality, Vol 2, No 4, p 485-488, October-December 1973. 1 fig, 5 tab, 24 ref.

Descriptors: Persistence, Movement, *Path of pollutants, *Pesticide kinetics, *Watersheds(Basins), *2 4 5-T, Leaching, Chlorinated hydrocarbon pesticides, Soil physical properties, Chemical analysis, Sampling, Soil chemical properties, *North Carolina, Methodology, Herbicides, Soils, Environmental effects, Soil analysis, Solvent extractions, Cores, Soil temperature, Climatic data, Bulk density, Depth, Organic matter, Hydrogen ion concentration, Air temperature, Hydraulic conductivity, Porosity, Clay loam, Pesticide residues.
Identifiers: *Picloram, Electron capture gas chromatography, Sample preparation, Chemical recovery, Sandy loam.

The movement and persistence of picloram (4-amino-3,5,6-trichloropicolinic acid) and 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) were studied on a western North Carolina watershed on which extensive agronomic, hydrologic, and climatic data had been accumulated over a period of 18 years. Immediately after spraying, 20 core samples were taken to a depth of 5 cm and composited for determination of the amount of herbicide reaching the soil. The samples were placed in polyethylene bags and frozen. Additional samples (10 cores each) were taken 15, 50, and 100 days after spraying. Prior to analysis, the samples were thawed, air-dried, and sieved through a 2-mm sieve. A 50-g sample was acidified with 0.25 N HCl, mixed with ethyl acetate, shaken for 30 min, and filtered. After a second extraction, the solvent was combined with the first extract which was then made basic with NH4OH. The herbicides were partitioned into water, the aqueous solution acidified, and the herbicides partitioned back into ethyl acetate. Base was added, the solvent evaporated and the herbicides dissolved in methanol, methylated with diazomethane, and determined by electron capture gas chromatography. Picloram was more persistent than 2,4,5-T; approximately 60 percent of the picloram and 90 percent of the 2,4,5-T disappeared in 15 days. There was some penetration into the soil, but a very high percentage of the total amount present at the different sampling periods was in the 0- to 7.5-cm layer. Doubling the application rate (4.48 vs 2.24 kg/ha) resulted in a two-fold increase in the amount of herbicide recovered at each sampling period. Very little downslope movement of either herbicide occurred even though the average slope on the plots was approximately 27 percent. Practically no herbicide was found more than 0.3 m, and none beyond 1.2 m, downslope. More picloram than 2,4,5-T moved. (Holoman-Battelle)
W74-05459

INOSITOL POLYPHOSPHATES IN ACTIVATED SLUDGE,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia).
D. J. Cosgrove.
Journal of Environmental Quality, Vol 2, No 4, p 483-485, October-December 1973. 1 fig, 2 tab, 12 ref.

Descriptors: *Activated sludge, Chemical analysis, *Pollutant identification, Methodology, Organophosphorus compounds, Phosphorus, Separation techniques, Hydrolysis, Solvent extractions, *Phosphorus compounds, *Phosphates, *Chromatography.
Identifiers: Sample preparation, Inositol polyphosphates, *Ion exchange chromatography, Paper chromatography, Organophosphates, Myo-inositol hexaphosphate, Scyllo-inositol hexaphosphate, Chiro-inositol hexaphosphate, Neo-inositol hexaphosphate, Myo-inositol pentaphosphate, Chiro-inositol pentaphosphate, Scyllo-inositol pentaphosphate, Neo-inositol pentaphosphate.

Although it is known that some of the soluble inorganic phosphate present in waste water can be fixed as organic forms in the activated sludge process, there is little knowledge of the chemical nature of these products. Recently, the extraction of 'inositol phosphate' from activated sludge was described, but whether the product consisted only of myo-inositol phosphates or was a mixture was not determined. In the present investigation, inositol polyphosphates were extracted from activated sludge using methods previously developed in investigations of soil organic phosphates. Ion exchange chromatography of the purified extract showed it to be a mixture of penta- and neo-inositol and thus to resemble the inositol polyphosphate component of soil organic matter. As the same polyphosphate mixture does not apparently occur in raw sewage (hydrolysates of dried raw sewage were found to contain no other inositol but the myo-isomer), it would appear that it is formed as a result of biological action during the aeration process. (Holoman-Battelle)
W74-05467

ANIONIC ELECTROPHORETIC PATTERN OF FIVE RUTHENIUM SALTS IN FRESH AND SEA WATER: EFFECTS OF AGING AND DILUTION,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium). Laboratoires.
For primary bibliographic entry see Field 5A.
W74-05479

ALGAE IN THE SPOON RIVER, ILLINOIS 1971-1972,
Illinois State Water Survey, Peoria. Water Quality Section.
S. Lin, R. L. Evans, and D. B. Beuscher.
Water Resources Bulletin, Vol 9, No 6, p 1112-1124, December 1973. 9 fig, 5 tab, 15 ref.

Descriptors: *Chrysophyta, *Chlorophyta, *Euglenophyta, *Aquatic algae, *Cyanophyta, Temporal distribution, Ecological distribution, Dominant organisms, Water quality, Diatoms, Dissolved oxygen, River flow, Coliforms, Water sampling, Streamflow, Water temperature, Microscopy, Spatial distribution, Probability, Nutrients, Speciation, Anabaena, Chlorella, Scenedesmus, Chlamydomonas, Euglena, *Illinois.
Identifiers: Species density, *Species diversity index, *Spoon River(Ill.), Flagellates, Species diversity, Desmids, Sample preservation, Enumeration, Fecal coliforms, Aphanizomenon, Oscillatoria, Actinastrum, Ankistrodesmus, Coelastrum, Crucigenia, Oocystis, Pediastrum, Ulothrix, Asterionella, Caloneis, Cyclotella, Diatoma, Fragilaria, Gomphonema, Gyrosigma, Melosira, Navicula, Nitzschia, Pleurosigma, Rhoicosphenia, Stephanodiscus, Surirella, Synedra, Tabellaria, Dinobryon, Phascus.

As a part of a water quality survey of the Spoon River, Illinois, algal genera were identified and their densities were enumerated. Weekly samples were collected at five stations starting on June 1, 1971. This report presents the first year's results. Algal densities for each station were found to be distributed geometrically normal. Total algal densities increased as water progressed downstream. Although water temperature has been observed to be an important factor affecnd the composition of algae in streams, attempts to correlate algal densities with temperatures for the Spoon River were not fruitful. Correlations of algal densities with dissolved oxygen, flow, and coliform densities also could not be made. The dominant genera observed were Cyclotella, Navicula, Scenedesmus, and Euglena. On the average diatoms accounted for 87 percent of all algae counts. The average

diversity indices varied about 1.0 to 1.5 for five stations. There did not appear to be any advantage in the use of diversity index over that of algal density and genera richness in characterizing algae in the Spoon River. (Holoman-Battelle)
W74-05483

NITROGEN TRANSFORMATIONS IN SEDIMENTS AS AFFECTED BY CHEMICAL AMENDMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
R. L. Chen, and D. R. Keeney.
Water Resources Bulletin, Vol 9, No 6, p 1136-1144, December 1973. 8 tab, 27 ref.

Descriptors: *Nitrogen, Sediments, Lakes, *Lake sediments, Hydrogen ion concentration, Water quality, Nitrification, Denitrification, Nitrogen fixation, *Calcium carbonate, Ammonification, Acids, Methane, *Wisconsin, Ammonia, Phosphorus, Iron, Oxygen, Calcium, Nitrates, Nitrites, Calcium chloride, Magnesium compounds.
Identifiers: Aluminum sulfate, Mineralization, Immobilization, Calcareous sediments, Sample preservation, Sodium carbonate, Acetylene reduction, Biotransformation, *Lake Mendota(Wis.), *Lake Tomahawak(Wis.).

A study was conducted to elucidate some of the chemical factors affecting the rate and pathways of N transformations in lake sediments. The main emphasis was placed on modifying a noncalcareous sediment with CaCO3 to approximate the composition of a sediment. Additionally, the effects of Ca (2 plus), CO3 (2 minus), Mg (2 plus) and OH (minus) were evaluated by using appropriate chemicals. Further, the effect of aluminum sulfate was evaluated with both sediment types. Sediment pH at 7 days was not affected by CaCO3, but was decreased by aluminum sulfate. The CaCO3 treatment increased the rate of ammonification, nitrification, reduction of acetylene to ethylene and methane formation, while with few execptions the other treatments decreased the rate of the transformations studied. Aluminum sulfate, which has been proposed as a lake restoration treatment, increased ammonification but decreased most of the other transformations. (Mortland-Battelle)
W74-05485

METHANE FORMATION BY LAKE SEDIMENTS DURING IN VITRO INCUBATION,
Wisconsin Univ., Madison. Dept. of Soil Science.
A. N. Macgregor, and D. R. Keeney.
Water Resources Bulletin, Vol 9, No 6, p 1153-1158, December 1973. 4 tab, 15 ref.

Descriptors: *Lake sediments, *Methane, *Synthesis, *Incubation, Nitrates, Sulfates, Water temperature, Sampling, Gas chromatography, Hardness(Water), *Wisconsin, Sediments, Lakes, Oxidation-reduction potential.
Identifiers: Acetylene, Carbon reduction, Helium atmosphere, Sample preservation, *Lake gases.

The ability of lake sediment samples to store and synthesize methane was tested using samples from Wisconsin lakes. Both hardwate and softwater lakes were investigated. The effects of nitrate, sulfate, and acetylene amendments, as well as temperature, were also investigated. Using a sediment-coated glass bead system as described, sediments showed linear increases in methane synthesis from the moment helium purging ceased for periods up to three weeks. The results indicate that the sediment samples examined have roughly the same capacity to store methane generated in vivo, but depending upon their origin (e.g. softwater or hardwater lakes) differ significantly in their capacity to synthesize methane from sediment precursors. Sediment samples from hardwater lakes produced 10 to 20 times as much methane as sediment from softwater lakes. This difference in methane generating capacity appears to be due to CaC03. It is apparent that measurement of standing crop of 'native methane' in sediments may not be a useful indication of the actual rate of methane synthesis. Both nitrate and sulphate were apparently able to inhibit methane synthesis by raising the Eh of the sediment to more positive values. Inhibition, at least by nitrate, may be temporary. (Mortland-Battelle)
W74-05487

TREND SULFACE ANALYSIS AND SEASONAL DISTRIBUTION PATTERNS OF PRIMARY NUTRIENTS AND CHLOROPHYLL IN UNSTRATIFIED GULF COAST ESTUARIES,
Texas Univ., Houston. School of Public Health.
I. Cechova, and E. M. Davis.
Water Resources Research, Vol 8, No 6, p 1543-1554, December 1973. 11 fig, 1 tab, 9 ref.

Descriptors: *Distribution patterns, *Nutrients, *Estuaries, Water pollution sources, *Seasonal, *Dispersion, *Chlorophyll, Mapping, *Texas, Mixing, Runoff, Phosphorus, Nitrogen, Carbon, Spatial districution, Data processing, Phosphates, Nitrates, Nitrites, Primary productivity, Movement, Temporal distribution.
Identifiers: Symap, Chlorophyll a, Data interpretation, Enrichment, Fate of pollutants.

The technique of data display, the synographic mapping system (Symap), was applied in ecological studies of unstratified Gulf Coast estuaries. Thirty-four computer maps of spatial distribution of primary nutrients and chlorophyll concentrations in San Antonio and Matagorda (Texas) estuaries were prepared from survey data covering the period 1970-1971. The maps provided a convenient means for detecting the sources of estuarine enrichment by primary nutrients and of seasonal changes in dispersion patterns. Weighted average concentrations of each compound in the entire estuarine water mass were determined from such displays and used in comparison of concentrations for different months of the survey period. The data presented on Symap displays were used in the determination of mixing and exchange efficiency in the estuaries. The results indicated that incoming nutrients often have very short residence times. The efficiency of exchange and residence time of each compound vary significantly within a year, conditioned by variable compound loading, quantity of tributary runoff, range of tidal activity, and variable biological food demand. An attempt was made to relate the chlorophyll a concentrations obtained as weighted averages from Symap displays to concentrations a phosphorus, nitrogen, and carbon, to the amount of tributary runoff, and to yearly seasons by means of coaxial graphical correlation. (Little-Battelle)
W74-05488

NITROGEN FIXATION IN A SUBARCTIC MIRE,
Kungliga Lantbrushogskolan, Uppsala (Sweden).
U. Granhall, and H. Selander.
Oikos, Vol 24, No 1, p 8-15, 1973. 2 fig, 6 tab, 26 ref.

Descriptors: *Nitrogen fixation, *Nitrogen fixing bacteria, *Cyanophyta, *Permafrost, *Marshes, Methane bacteria, Subarctic, Cold regions, Bogs, Mosses, Lichens.
Identifiers: *Acetylene reduction, *Sweden(Lappland).

An investigation of biological fixation of atmospheric nitrogen in situ, as part of the Swedish IBP Tundra Biome Project, was carried out during the summer of 1971. The main site was a subarctic - continental, ombrotrophic mire with permafrost, situated near Abisko in Lappland (northern Sweden). Nitrogen fixation was measured by the method of acetylene reduction. Samples of moss and algae were examined microscopically for N-fixing blue-green algae. Aerobic N-fixing bacteria were estimated on a modified Burk's Azotobacter medium. Methane-producing bacteria were cultivated in Barker's selective medium. Low nitrogen fixation, mainly by aerobic bacteria, occurred in elevated (ombrotrophic) areas of the mire. In large wet depressions and pools, on the other hand, fixation by blue-green algae was quite appreciable. The algae were found to be epiphytically or intracellularly associated with Sphagnum and Drepanocladus mosses. Lichens with blue-green algal phycobionts or cephalodia were rare at the investigated site, and the few plants tested showed comparatively small activity, probably due to poor nutritional status (ombrotrophic conditions). In other parts of the Tornetrask area they were, however, considered to be of great importance. (Little-Battelle)
W74-05489

METAL COORDINATION COMPOUNDS OF THIABENDAZOLE,
Western Washington Research and Extension Center, Puyallup.
For primary bibliographic entry see Field 5A.
W74-05490

THE KINETICS OF YEAST GROWTH ON PURE HYDROCARBONS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Microbiological Inst.
H. W. Blanch, and A. Einsele.
Biotechnology and Bioengineering, Vol 15, No 5, p 861-877, September 1973. 12 fig, 36 ref.

Descriptors: *Yeasts, *Growth chambers, *Organic compounds.
Identifiers: *Substrate utilization, *Hexadecane, *Growth kinetics, Continuous cultures, Candida tropicalis, Aliphatic hydrocarbons, Deuteromycetes, Biological flocculation.

The kinetics of C. tropicalis growth were investigated with pure n-hexadecane as idspersed phase substrate. Two distinct growth phases were found; in the first phase, exponential growth was independent of stirrer speed. The onset of the second phase, one of linear growth, was determined by stirrer speed. By the use of two different fermenter types, it was shown that the drop size of the dispersed phase was not primarily responsible for the observed kinetics. It was considered that the formation of biological flocesd the observed growth pattern. This was substantiated by the results of continuous cultures in the different fermenter types, with various substrate concentrations. (Holoman-Battelle)
W74-05493

TRANSPORT, FATE AND GEOCHEMICAL INTERACTIONS OF MERCURY, CADMIUM AND OTHER INORGANIC POLLUTANTS IN THE COASTAL LITTORAL-SALT MARSH ENVIRONMENT OF THE SOUTHEASTERN UNITED STATES.
Skidaway Inst. of Oceanography, Savannah, Ga.
Available from the National Technical Information Service as PB-230 037 $6.00 in paper copy, $1.45 in microfiche. Annual Progress Report, January 1974. 242 p. EPA R-800372.

Descriptors: *Path of pollutants, *Heavy metals, *Estuaries, *Water chemistry, *Atlantic Coastal Plain, Mercury, Cadmium, Copper, Iron, Manganese, Salt marshes, Water chemistry, Organic matter, Sorption, Chemical precipitation, Suspended load, *Southeast U.S., South Carolina, Georgia, Florida.

Study of the transport, fate, and geochemical interaction of heavy metals (primarily mercury and cadmium) being transported into the littoral salt marsh environment in the Southeastern United States Coast between Georgetown, S.C., and Jacksonville, Fla., involves both field and laboratory studies. The concentration of Hg, Cd, Cu, Fe and Mn in water and suspended sediments samples

from the major rivers emptying along the Southeastern Atlantic Coast was determined bimonthly to establish seasonal and spatial variations. The flux of heavy metals through salt marsh estuaries is controlled by processes which occur at river-estuary and salt marsh-sediment boundaries. These processes include adsorption-desorption reactions, flocculation, precipitation and sedimentation. Along with estuarine circulation they effectively control the residence time of metals in estuaries. Some biological processes, such as uptake by marsh vegetation, may serve as efficient mechanisms to recycle metals otherwise lost to estuarine sediments. Upon entry into estuaries in river runoff a large portion of dissolved iron and manganese precipitate out of solution and accumulate in sediments along with particulate fractions of these metals. Most cadmium and copper in solution is transported through salt marsh estuaries while particulate fractions are apparently lost to the sediments. All dissolved mercury and apparently a desorbable fraction of that in particulate matter is transported through the salt marsh system. (See also W74-05502 thru W-74 05506) (Knapp-USGS)
W74-05501

HEAVY METAL FLUXES THROUGH SALT MARSH ESTUARIES,
Skidaway Inst. of Oceanography, Savannah, Ga.
H. L. Windom.
Skidaway Institute of Oceanography Annual Progress Report (EPA Project No R-800372), Appendix A, p 30-56, January 1974. 5 fig, 6 tab, 22 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Estuaries, *Water chemistry, *Atlantic Coastal Plain, Mercury, Cadmium, Copper, Iron, Manganese, Salt marshes, Water chemistry, Organic matter, Sorption, Chemical precipitation, Suspended load.

The flux of heavy metals through salt marsh estuaries is controlled by processes which occur at river-estuary and salt marsh-sediment boundaries. These processes include adsorption-desorption reactions, flocculation, precipitation and sedimentation. Along with estuarine circulation they effectively control the residence time of metals in estuaries. Some biological processes, such as uptake by marsh vegetation, may serve as efficient mechanisms to recycle metals otherwise lost to estuarine sediments. Upon entry into estuaries in river runoff a large portion of dissolved iron and maganese precipitate out of solution and accumulate in sediments along with the particulate forms of these metals. Most cadmium and copper in solution is transported through salt marsh estuaries while particulate forms are apparently lost to the sediments. All dissolved mercury and apparently a desorbable fraction of that in particulate matter is transported through the salt marsh system. (See also W74-05501) (Knapp-USGS)
W74-05502

ORGANIC AND INORGANIC GEOCHEMISTRY OF SOME COASTAL PLAIN RIVERS OF THE SOUTHEASTERN UNITED STATES,
Georgia Inst. of Tech., Atlanta. School of Geophysical Sciences.
K. C. Beck, J. H. Reuter, and E. M. Perdue.
Skidaway Institute of Oceanography Annual Progress Report (EPA Project No R800372), Appendix B, p 57-118, January 1974. 5 fig, 5 tab, 80 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Estuaries, *Water chemistry, *Atlantic Coastal Plain, Mercury, Cadmium, Copper, Iron, Manganese, Salt marshes, Water chemistry, *Organic matter, Sorption, Chemical precipitation, Suspended load, *Georgia.
Identifiers: *Satilla River(Geo.).

In a comprehensive study of the distribution of organic and inorganic constituents in natural waters, the chemical compositions of several rivers flowing through the Coastal Plain of southeast Georgia (the Satilla River, in particular) have been investigated. These streams are generally characterized by low suspended load, low ionic strength, low pH values, and a predominance of organic over inorganic constituents. The dominance of sodium and chloride among inorganic ions indicates that rainfall is a major factor in determining the distribution of major elements in these waters. The low pH values and the relatively high concentrations of iron and aluminum appear to result from the high concentrations of organic matter. River water organic matter is chemically similar to soil fulvic acids. The dominance of organic matter over inorganic constituents and the resultant low pH values of these waters are in direct contrast with the chemical compositions of most of the rivers of the world which have been previously studied. (See also W74-05501) (Knapp-USGS)
W74-05503

CHEMICAL CHARACTERISTICS OF DISSOLVED ORGANIC MATTER IN RIVER WATER,
Georgia Inst. of Tech., Atlanta.
S. J. Martin.
Skidaway Institute of Oceanography Annual Progress Report (EPA Project No R-800372), Appendix C, p 119-170, January 1974. 7 fig, 6 tab, 32 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Estuaries, *Water chemistry, *Atlantic Coastal Plain, Mercury, Cadmium, Copper, Iron, Manganese, Salt marshes, Water chemistry, Organic matter, Sorption, Chemical precipitation, Suspended load, *Georgia.
Identifiers: *Satilla River(Geo.).

Dissolved organic matter from the Satilla River, a Coastal Plain river of southeast Georgia, and a tributary swamp was studied by separation into chromatographically homogeneous fractions. The oxygen-containing functional group content of each fraction increases with decreasing molecular weight. Total acidity ranges from 7.3 to 12.9 meq/g, and carboxyl group content from 3.2 to 9.5 meq/g. River water organic matter close to a swamp source shows lower total acidity and carboxyl group content when compared to organic matter further downstream. Carbon ranges from 40.0% to 54.3%, hydrogen from 3.4% to 5.6%, nitrogen from 0.7% to 1.9%, and oxygen from 39.6% to 55.3%. The molecular weight of the unfractionated organic matter is 1322, and is in close agreement with the molecular weight of 1266 determined on the original material. The fraction with the highest molecular weight is similar to humic acid, but accounts for only a small portion of the total organic matter, the rest of which resembles fulvic acid. Humic substances of a rather narrow molecular weight range are leached from a swampy, low relief area. As they are transported downstream, the higher molecular weight portion is removed from solution by flocculation. The soluble organic matter remaining exerts control on the water chemistry of the river through exchange reactions with the inorganic constituents and through dissociation. Since the transportation and accumulation of toxic pollutants such as heavy metals is greatly influenced by their association with river water organic matter, the results of this study should be of interest to those concerned with environmental problems. (See also W74-05501) (Knapp-USGS)
W74-05504

A HYDROGRAPHIC INVESTIGATION OF WINYAH BAY, SOUTH CAROLINA AND THE ADJACENT COASTAL WATERS,
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 2L.
W74-05505

AN IMPROVED ION-EXCHANGE TECHNIQUE FOR THE CONCENTRATION OF MANGANESE FROM SEA WATER,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5A.
W74-05506

EVALUATION OF PEATLAND WATER TABLE ELEVATION AND WATER QUALITY INDICATORS,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-05517

THE OCCURRENCE AND DISTRIBUTION OF THE HYDROIDS OF THE GALVESTON BAY, TEXAS, AREA,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 2L.
W74-05529

OIL IN SCOTTISH WATERS,
Office of Naval Research, London (England).
J. M. Leonard.
Available from NTIS, Springfield, Va 22151 as AD-766-432 Price $3.00 printed copy; $1.45 microfiche. Conference Report C-12-73, June 1973. 6 p.

Descriptors: *Oil spills, *Water pollution effects, *Water pollution treatment, *Conferences, Atlantic Ocean, Biodegradation.
Identifiers: *Scotland.

The petroleum discoveries in the northern North Sea and their implications for the ecology of Scotland's waters was the theme of the third annual meeting of the Scottish Marine Biological Association in Stirling. This is a 6-page summary of that meeting. The topics discussed include: exploration and production of North Sea oil, with reference to ecological aspects; problems of oil pollution and combating oil; use of oil dispersants; oil degradation by bacteria; hydrocarbons in the marine environment; and Littorina saxatilis as an index of dispersants. (Knapp-USGS)
W74-05551

CAESIUM-137 AS A WATER MOVEMENT TRACER IN THE ST GEORGE'S CHANNEL,
Institute of Oceanographic Sciences, Birkenhead (England).
For primary bibliographic entry see Field 2E.
W74-05555

PRIMER ON AGRICULTURAL POLLUTION,
C. P. Gratto, W. R. Webber, F. G. Viets, Jr., J. P. Law, and J. L. Witherow.
Journal of Soil and Water Conservation, (Vol 26), p 44-65, March-April 1971. 22 p, 5 tab.

Descriptors: *Agriculture, *Water pollution sources, *Farm wastes, Management, *Water quality, *Water conservation, Sediment, Fertilizer, Irrigation practices, Waste disposal, Fertilization, Crop production, Productivity, Water requirements, Soil treatment, Pesticide residues, Chemical wastes, Pollutants, Contamination(Water), Sedimentation, Sediment yield.

The five major groups of pollutants generated by agriculture are animal wastes, fertilizers, irrigation residues, pesticides, and sedimentation. Growing concern about animal waste treatment, use and disposal coincides with the public's concern about the overall problem of waste management and environmental quality. High density confinement of livestock compounds the problems of waste utilization or disposal. Environmentalists argue that since nitrogen and phosphorous are factors in eutrophication, nitrogen fertilizers contribute to

both surface and groundwater pollution. Evidence indicates the probable connection between water quality deterioration and increased fertilizer use. Water quality problems resulting from irrigation are primarily due to the fact that irrigation is a major water consumer. Plants extract water from the supply, resulting in a concentration of dissolved mineral salts, present in all natural waters. Irrigation also adds pollutants by leaching natural salts and other materials from the soil. Special attention must be given to the rates of accumulation of pesticides and their breakdown products in soil, to the extent of contamination of water resources. Sediment has a twofold environmental effect. It depletes the land resource from which it is derived and impairs the quality of water which it is deposited in. (Silber-Florida)
W74-05569

AQUATIC ANOMALIES: SYMPTOMS OF A SICK OCEAN,
Florida Conservation Foundation, Winter Park. Environmental Information Center.
B. Barada.
The Florida Naturalist, Vol 46, No 4, p 2-12, 1973. 13 photo.

Descriptors: *Water, *Water pollution, *Water pollution sources, *Environmental effects, Ecology, Marine animals, Marine biology, Marine fisheries, Shellfish, Algae, Nutrients, Oxygen, Oxygen demand, Toxicity, Water purification, Coasts, Oceans, Water pollution effects, Ecosystems, Wastes, Waste dilution.

A few years ago a study was begun of aquatic anomalies regarding destruction and deterioration of fisheries, shellfish beds, habitats of sea birds and unexplained algal blooms. Practically all of these aquatic anomalies are directly or indirectly associated with pollution. The criteria for evaluating the extent and degree of marine pollution are inadequate, since they are based on the fallacy that the ocean has an unlimited capacity to dilute waste water effluent without harm to the marine ecosystem. The quality of receiving waters is measured in terms of biological oxygen demand, dissolved oxygen and coliform bacteria counts, all of which theoretically determine if the water is receiving a greater quantity of nutrients than its natural purification processes can handle. Usually, however, if there is sufficient dissolved oxygen in the water, the water is classified as not badly polluted. Many toxic persistent compounds do not become diluted, but rather accumulate in the ecosystem, and can be lethal to marine flora and fauna. Florida's marine resources are particularly vulnerable because the toxic effects of practically all marine poisons and diseases are exaggerated in warmer waters. (Ritchie-Florida)
W74-05572

A SMALL OIL SPILL,
Woods Hole Oceanographic Institution, Mass.
M. Blumer, H. L. Sanders, J. F. Grassle, and G. R. Hampson.
Environment, Vol 13, No 2, p 2-12, March 1971. 2 map, 2 photo.

Descriptors: *Oceans, *Water pollution sources, *Oily water, *Oil wastes, *Aquatic life, Industrial wastes, Sea water, Contamination, Aquatic environment, Waste discharge, Wastewater disposal, Chemical wastes, Food, Food chains, Fishlife, Water pollution effects, Fishkill, Pollutants, Toxins, Water quality, Impaired water quality, Coasts.

Oil pollution of the ocean is an increasingly serious global problem. The oils in petroleum are different in composition and toxicity from those occurring naturally in living marine organisms. These differences present a threat to ocean life and ultimately to human welfare, particularly in view of the scope of the pollution. Scientists point out that the major catastrophes such as tanker wrecks receive the headlines, but the smaller day-to-day spills in coastal waters and harbors of the world produce chronic pollution much larger in volume and probably more severe in biological consequences. Chronic oil pollution contaminates nearshore waters that are the key to the survival of most marine animals that are taken for man's food. Over a long period of time, this persistent pollution may interfere with the normal life processes of the organisms--as well as killing them outright at high concentrations. The result may be progressive disappearance of usually abundant fish and shellfish. Their decline would be accompanied by an increase in pollution-tolerant species that generally indicate an unhealthy state of biological affairs. Furthermore, remaining organisms of food value to man may be permanently contaminated with petroleum hydrocarbons that could be hazardous to health. (Silber-Florida)
W74-05578

DIFFUSION OF CATTLE MANURE SOLUTION THROUGH A WET POROUS STRATUM WITH REACTION,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
S. K. Choi, L. T. Fan, L. E. Erickson, and R. I. Lipper.
Water Air Soil Pollut. Vol 1, No 4, p 390-404. 1972, Illus.
Identifiers: *Diffusion, *Manure(Cattle), *Mathematical models, Pollution, Porous media, Solution, Stratum, Water pollution sources, *Chemical oxygen demand.

A processing governing the transport rate of cattle manure as measured by COD through a wet porous stratum is investigated under simulated conditions. A mathematical model of the system is presented. The model simulates diffusion and biological reaction processes taking place simultaneously in the system. Experimental observations determine the diffusion coefficient and the biological reaction rate constant of the cattle manure solution. Values of approximately 6,760,000 sq cm/5 for the diffusion coefficient and 0.0305/day for the reaction rate constant at the temperature of 25 plus or minus 2C are obtained. For the system with a known diffusion coefficient and reaction rate constant, the analytical expressions can be used to approximately evaluate or predict the rates that animal wastes will contaminate surface water, soil or ground water.--Copyright 1973, Biological Abstracts, Inc.
W74-05591

RESULTS OF MONITORING FOR TRITIUM INCORPORATION AT THE KARLSRUHE NUCLEAR RESEARCH CENTER IN 1971 AND 1972, (ERGEBNISSE DER TRITIUM-INKORPORATIONSUBERWACHUNG IM KERNFORSCHUNGSZENTRUM KARLSRUHE IN DEN JAHREN, 1971-1972),
Kernforschungszentrum, Karlsruhe (West Germany).
For primary bibliographic entry see Field 5A.
W74-05613

BIOLOGICAL MANAGEMENT AND CONSERVATION: ECOLOGICAL THEORY, APPLICATION AND PLANNING,
For primary bibliographic entry see Field 6G.
W74-05622

SOME ECOLOGICAL EFFECTS OF DISCHARGED SUGAR MILL WASTES ON MARINE LIFE ALONG THE HAMAKUA COAST, HAWAII,
Hawaii Univ., Honolulu. Inst. of Marine Biology.
For primary bibliographic entry see Field 5C.
W74-05660

ON THE NECESSARY AND SUFFICIENT CONDITIONS FOR A LONG-TERM IRRIGATED AGRICULTURE,
Economic Research Service, Davis, Calif. Farm Production Economics Div.
C. V. Moore.
Water Resources Bulletin, Vol 8, No 4, p 802-812, August, 1972. 3 fig, 12 ref.

Descriptors: *Water quality, *Irrigation effects, *Salinity, Salt balance, Irrigation practices, Water management(Applied), Drainage, Water pollution sources, Soil analysis, Soil chemical properties, Irrigated land, Irrigation water.

Salinization and water logging have been the nemesis of irrigated agriculture societies. Low quality water substitutes for high quality water for irrigation at an increasing rate up to the limits of the soil's ability to transmit the additional water and remove excess salts from the root zone. Soil transmissibility can be increased by additional investment in drainage ditches and underground tile. Low valued high salt tolerant crops can be substituted for higher valued salt sensitive crops to maintain production in areas served by irrigation water sources of deteriorating quality. Thus physical factors specify the necessary conditions for survival of an irrigated agriculture. The conditions for survival must be in terms of a positive net income in each subplanning period discounted to its present value. (Skogerboe-Colorado State)
W74-05663

MOVEMENT OF NITRATES UNDER IRRIGATED AGRICULTURE,
Nebraska Univ., Lincoln. Coll. of Engineering and Architecture.
D. M. Edwards, P. E. Fischbach, and L. L. Young.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 15, No 1, p 73-75, January-February, 1972. 6 fig, 14 ref.

Descriptors: *Nitrates, Nitrogen, *Water pollution sources, Leaching, Water quality control, Nutrient removal, Fertilizers, *Nitrogen compounds, *Path of pollutants.

Nitrate nitrogen is highly soluble in water, there by posing a threat of water pollution. A coordinated sequence of laboratory and field studies were conducted. Both mechanical placement and hydraulic injection were used to apply the fertilizer. The following conclusions were drawn: 1. once nitrates move below the soil surface they do not re-enter the runoff water; 2. nitrates move with the wetting front; 3. with a properly managed irrigation system little or no movement of nitrates outside the root zone should occur. (Skogerboe-Colorado State)
W74-05666

WATER-LEACHABLE NUTRIENTS FROM FROZEN OR DRIED PRAIRIE VEGETATION,
South Dakota State Univ., Brookings. Dept. of Plant Science.
E. M. White.
J Environ Qual. Vol 2, No 1, p 104-107, 1973. Illus.
Identifiers: Dried ground, Frozen ground, Minerals, *Nutrients, *Prairies, Runoff, *Vegetation, Water quality, *South Dakota, Leaching.

Runoff from agricultural lands in South Dakota is mainly from melting snow and spring rains. Nutrient enrichment of this water may be enhanced during the fall and winter by the rupturing of plant cells by freezing. Native prairie vegetation and mulch were sampled in late summer, early fall, and spring to determine the effect freezing, in comparison to drying, would have on nutrient release to water. Release of Ca, Mg, K, P, NO3-N, NH4-N by freezing was related to stage of growth or decomposition of the vegetation. Freezing increased nutrient release if the vegetation were growing when it was frozen. Soil genesis, ecological relations between plant spe-

cies, and runoff water quality could be affected by the relative release of different kinds of nutrients.--Copyright 1973, Biological Abstracts, Inc.
W74-05696

MARINA DEL REY: COMPUTER SIMULATION OF POLLUTANT TRANSPORT IN SEMI-ENCLOSED WATER BODY,
University of Southern California, Los Angeles. Ocean Engineering Program.
M. G. Brandsma, J-J Lee, and F. R. Bowerman.
Available from NTIS as COM 73-11863, $4.25 paper copy, $1.45 microfiche. Sea Grant Publication No. USC-SG-1-73, June 1973. 113 p, 21 fig, 1 tab, 35 ref, 3 append. NOAA SG 04-3-158-45.

Descriptors: *Tides, *Pollutants, Marinas, *Simulation analysis, *Dispersion, California, Computers.
Identifiers: *Tidal flushing, Marina del Ray(Calif).

Tidal flushing characteristics of Marina del Rey were investigated by computer simulation. Because of the special geometry of Marina del Rey which can be approximated by one-dimensional segments, the model developed by Fischer (a Method of Predicting pollutant Transport in Tidal Waters, a University of Calif. at Berkeley, Water Resources Center Contribution No. 132, 1970) is used for the simulation process. A mass-conservation equation is used with tidal data to compute tidal flows. Dispersion of pollutants between fluid elements is calculated using a modified Elder's equation for dispersion in wide open-channel flow. Time proceeds in a series of finite steps, each of which has a convective part and a dispersive part. Data for the program are provided from tide recordings made at various points in the marina. The results show comparative flushing characteristics for pollutants discharged at various locations in Marina del Rey. The most striking characteristic of the marina is its sensitivity to variations in locations and time of pollutant injections. The main channel has a great deal more flushing activity than the basins. The timing of pollutant injections relative to tidal phases is very important in determining what percentage of material will be flushed out in a given time. (Sinha - OEIS)
W74-05698

CHARACTERISTICS OF CONDENSER WATER DISCHARGE ON THE SEA SURFACE (CORRELATION OF FIELD OBSERVATIONS WITH THEORY),
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5A.
W74-05700

A MODEL OF A NUTRITIONAL ECOSYSTEM TO CONSERVE NUTRIENTS FOR MAN,
Washington State Univ., Pullman. Dept. of Animal Science.
R. P. Kromann.
Nutr Rep Int. Vol 7, No 1, p 33-43, 1973, Illus.
Identifiers: Algae, Animals, Conservation, Cycling, *Ecosystem(Nutritional), Fauna, Fish, Flora, Model studies, *Nutrients, Pollution, Ruminants, *Recycling.

A model of a nutritional ecosystem is described as a system of recycling nutrients in an ecological, 'closed' system. It is an integration of several natural ecosystems which would utilize the 'waste product nutrients' of man. The ecosystem could eliminate these nutrients from polluting environmental air and water, thereby conserving energy, protein, vitamins and minerals which are needed to nourish a growing and hungary population. The nutrients would be conserved by simple stomached and ruminant animals, plants, microflora (algae), microfauna and fish. The nutrients of these plants and animals would be utilized by man, other animals or plants. Nutrients in the excrement of animals would also be recycled. Non-polluted water (possibly potable water) and O2 would also be obtained from this system.--Copyright 1973, Biological Abstracts, Inc.
W74-05704

THE INTERDEPENDANCE OF MARINE AND ESTUARINE ECOSYSTEMS IN SOUTH AFRICA,
Natal Univ., Durban (South Africa). Oceanographic Research Inst.
A. E. F. Heydorn.
S Afr J Sci. Vol 69, No 1, p 18-24, 1973, Illus.
Identifiers: Depletion, *Ecosystems, *Estuarine environment, Eutrophication, *Marine environment, Oxygen, Poison, Salinity, Silt, *South Africa(Natal), Hydrogen ion concentration.

The main features of the ecology of the coastal regions of Natal are described to illustrate that the terrestrial and marine ecosystems cannot be placed into 2 separate compartments. Estuaries in particular represent areas of overlap of land and sea, and life in them is therefore exceptionally rich. The wide range of organisms living in them in a state of interdependence renders estuaries vulnerable to man-induced environmental changes which can upset the natural equilibrium. Such changes can be in the form of siltation, eutrophication, O2 depletion, poisoning, or the upsetting of salinity balances of pH-levels. Most of these phenomena can be illustrated by Durban Bay or St Lucia. It is also clear that these organisms do not distinguish between individual estuaries but depend upon Natal's estuarine environment as a whole. Coastal currents and water movements provide effective longshore transport mechanisms for a multitude of planktonic and other drifting forms of life including juvenile fish and prawn larvae. Thus the deterioration of Durban Bay and St. Lucia should not be regarded as 2 independent events, nor will the development of Richards Bay as a major harbor merely be of local ecological consequence.--Copyright 1973, Biological Abstracts, Inc.
W74-05713

A FACTOR ANALYSIS OF SELECTED WATER QUALITY VARIABLES IN CENTRAL NEW JERSEY DURING 1960-1969,
Rutgers-The State Univ., New Brunswick, N.J. Dept. of Geography.
R. M. Hordon.
Paper No H-58, presented at 53rd Annual Meeting of the American Geophysical Union, Hydrology Section, April 17-21, 1972, Washington, D.C., 22 p, 3 fig, 7 tab, 18 ref.

Descriptors: *Urbanization, *New Jersey, *Water quality, *Statistical methods, Correlation analysis, Computer programs.
Identifiers: *Factor analysis, *Raritan River Basin(N.J.).

Spatio-temporal changes in water quality in central New Jersey during 1960-69 were studied by a factor analytic methodology. The period included suburbanization with its resultant impact on watershed quality and periodic events such as the record drought of 1962-66. Eleven variables were available at each of three stations: temperature, pH, DO, turbidity, BOD, color, alkalinity, hardness, bacteria, discharge, and percent saturation. The factor structures generally reveal the following characteristic pattern: (1) an oxygen-status factor, represented by high loadings on temperature, DO, and BOD; (2) an appearance factor based on turbidity, color, and discharge; and (3) a third variable factor, loading occasionally on percent saturation. The oxygen-status factor tends to be the component of greatest statistical importance. Bacteria, hardness, pH, and alkalinity generally exhibit the lowest loadings of any of the 11 variables. Indeed, bacteria is the least related to any of the other variables in the data set. The cumulative degree of explanation of the rotated factors declined during the decade, suggesting an increase in independence developing among the variables. It is hypothesized that urbanization with its associated changes in land use and runoff patterns might be intervening in the natural ecology of the stream. The effects of urbanization, then, would be to interfere with in-stream interactions among the variables. The 30 factor structures were quantitatively compared by using a computer program called RELATE. The procedure was to compare structures based on identical sets of variables from year to year for the same station and from basin to basin for the same year. The results for the Raritan River watershed indicate that intrabasin and interbasin similarities outweigh the differences and that the factor structures evidence a high degree of stability during the decade of the 1960's. (Knapp-USGS)
W74-05716

WATER POLLUTION,
Robert S. Kerr Water Research Center, Ada, Okla.
W. C. Galegar.
In: Environmental Aspects of Geology and Engineering in Oklahoma; Proceedings of a Symposium of the Oklahoma Academy of Science, December 4, 1970, Stillwater: Annals of the Oklahoma Academy of Science, No 2, p 9-14, 1971. 2 ref.

Descriptors: *Water pollution control, *Oklahoma, Federal Water Pollution Control Act, Grants, Research and development, Corrosion, Fishkills, Thermal pollution, Treatment facilities.

In Oklahoma, the use of waters for industrial and municipal purposes has brought many problems. Among these are thermal stratification in lakes. Stratification in Keystone Reservoir caused oxygen-deficient zones that resulted in excessive corrosion as well as fish kills. Extremely high concentrations of minerals in Foss Reservoir are a result of both severe drought conditions in the impoundment area and a high evaporation rate. Other problems are pollution from industries, resulting in adverse conditions for aquatic life, and pollution by municipal wastes. The Environmental Protection Agency's most important contribution for clean water is a program of grants to municipalities for the purpose of providing adequate waste-treatment facilities. Also important are a research program to determine improved and more economical methods for controlling and treating wastes, and personnel assistance to various State and local agencies. (Knapp-USGS)
W74-05740

EROSION CONTROL,
Soil Conservation Service, Stillwater, Okla.
For primary bibliographic entry see Field 2J.
W74-05741

NATURAL CHLORIDE POLLUTION, ARKANSAS AND RED RIVER BASINS,
Army Engineer District, Tulsa, Okla.
M. W. DeGeer.
In: Environmental Aspects of Geology and Engineering in Oklahoma; Proceedings of a Symposium of the Oklahoma Academy of Science, December 4, 1970, Stillwater: Annals of the Oklahoma Academy of Science, No 2, p 42-46, 1971.

Descriptors: *Water pollution control, *Brines, Texas, Oklahoma, Salts, *Chlorides, Saline water.
Identifiers: *Arkansas River basin, *Red River basin.

Natural chloride pollution occurs in the Arkansas and Red River basins. A control program has the objective of making the waters of these basins usable at points of need. Two salt source areas were chosen for supplemental field studies including exploration and experimental test facilities. Work at the first area, the Great Salt Plains, provided detailed information on the general geology,

source of the pollution, and nature of the brine emission. Experimental work includes testing the impoundment of freshwater over saline soils. Remote sensing was used in crop and groundwater studies. For the second area, on Jonah Creek in Childress County, Texas, plans call for a subsurface collection system, deep-well injection, evaporation-rate studies, preinjection treatment of brines, and seismic monitoring for earthquakes. (Knapp-USGS)
W74-05742

LANDSLIDES AND RELATED PHENOMENA PERTAINING TO HIGHWAY CONSTRUCTION IN OKLAHOMA,
Oklahoma State Dept. of Highways. Research and Development Div.
For primary bibliographic entry see Field 2J.
W74-05743

A FOUL TIDE,
R. Burton.
Sea Frontier, Vol 18, p 238-246, July 1972. 1 map, 5 photo.

Descriptors: *Oil wastes, *Water pollution sources, *Sewage effluents, *Aesthetics, Eutrophication, *Fish kill, Fouling, Agricultural chemicals, Industrial wastes, Phenols, Oxygen sag, Stagnant water, Water pollution effects, Toxicity, Waste water treatment, Economic aspects, *Water pollution control, Water quality, Wastes, Biodegradation, Ships.
Identifiers: *Rhine River.

Water pollution sources in densely populated areas of the world are discussed. Stagnant waters such as ditches, canals, and lakes can become grossly polluted by indiscriminate waste disposal. Even rivers can become so polluted that oxygen levels fall below that needed to sustain life. The Rhine is believed to contain as much oil pollution as was caused by the Torrey Canyon disaster. Not only is waste oil discharged into the Rhine, but large quantities of sewage enter the river each day. Rotterdam and the Haque obtain drinking water from the Rhine, and have found it necessary to construct reservoirs which trap water during the less polluted winter. The polluted Rhine water, after entering the North Sea, mixes with coastal waters dangerously close to fish nursery grounds. Chemical pollution in the Rhine has already destroyed a million dollar fishery for the Tubifex worm (aquarium food). The first major prosecutions for Rhine pollution concerned the release of 8,650 tons of caustic soda waste. Professor Korringa of the Netherlands Institute made several recommendations for curbing pollution in the Rhine: (1) treating seawage before discharge into coastal waters, (2) severe penalties for oil polluters, (3) the incineration of persistent chemicals and pesticides, (4) replacement of mercury, and (5) inoffensive dumping in areas with strong currents. (Sperling-Florida)
W74-05793

ADD SALT TO TASTE,
Habitat, Inc., Belmont, Mass.
H. H. McConnell, and J. Lewis.
Environment, Vol 14, p 38-44, November 1972. 3 photo, 37 ref.

Descriptors: *Sodium chloride, *Deicers, *Snow removal, Lakes, Rivers, Wildlife, Vegetation, Solubility, Dispersion, Percolation, Leaching, Water quality, Water pollution sources, Potable water, Porosity, Soil physical properties, Eutrophication, Drainage, Calcium chloride.

Nine million tons of salt were used in 1970 to clean snow from highways. These quantities of salt have adverse effects on public drinking water supplies, wildlife, vegetation, lakes, and rivers. A mixture of calcium chloride and sodium chloride lowers the freezing point of the brine solution and breaks the bond between ice and road. The danger is that high concentrations of salts may overload dispersal mechanisms. It is estimated that 25 to 50 per cent of the salt infiltrates to the groundwater. High runoff contaminates many shallow wells and can also affect wildlife by disturbing body processes. Salt in water supplies may be harmful to people with heart disease or those on low salt diets. Saline soil water will inhibit the plants intake of water and make soil less permeable. Substantial losses of roadside trees have occurred. Salt may also disrupt the vertical mixing in lakes and ponds through density stratification and degrade fish environments. (Sperling-Florida)
W74-05795

A DOUBLE MARINE DISASTER,
A. J. Nathan.
Sea Frontiers, Vol. 18, No. 4, p. 202-209, July-August 1972. 7 photo.

Descriptors: *Water pollution, Oil, Environment, *Environmental effects, Ships, Breeding, *Oil spills, Oil pollution, Ecology, Aquatic habitats, Shoals, Coasts, Fish, Food chain, Birds, Shore birds.
Identifiers: *South Africa(Cape Agulhas), *Penguins.

The 1971 sinking of the Wafra, a Liberian registered, American owned oil tanker threatened to be the worst disaster of its kind since the wreck of the Torrey Canyon. Running aground at Cape Agulhas, the tanker posed a threat to the nearby Dyer Islands, principal breeding grounds of the black-footed penguin. Already a diminishing species, the penguins are important to the ecology of the sea since they deposit their excreta (guano) into the water, which produces nitrogen for the phytoplankton upon which small fish feed. Shoals of pilchard then develop, which are in turn eaten by birds, humans and larger fish. It is important therefore that the shoals are sufficiently large to maintain the ecological cycle. A marine court of inquiry, while absolving the parties of blame for the incident, noted that if a deep-sea salvage tug had been available when the Wafra first encountered difficulty, the pollution probably could have been avoided. (Ritchie-Florida)
W74-05800

SUPERIOR-MICHIGAN-HURON-ERIE-ONTARIO: IS IT TOO LATE,
For primary bibliographic entry see Field 5G.
W74-05801

UNDERGROUND NUCLEAR TESTING PROGRAM, NEVADA TEST SITE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Division of Environmental Affairs (AEC), Washington, D.C.
Available from National Technical Information Service, Springfield, Va, 22151, as EIS-NV-73-0798-F, for $9.00 paper copy, $1.45 microfiche. April 1973. 121 p, 4 fig, 1 map, 1 photo, 3 append.

Descriptors: *Environmental effects, *Nuclear explosions, Craters, *Underground, *Water pollution sources, Radioactive wastes, Ecosystems, Plant growth, Terrestrial habitats, *Nevada, Federal government, Research priorities, Fresh water.
Identifiers: *Environmental Impact Statements, *Northern Yucca Flat(Nev).

No significant adverse effects on the environment are anticipated as a result of the Atomic Energy Commission's underground nuclear testing program. The probable impact on the environment due to continued underground nuclear testing at the site will be small. A large amount of radioactive matter will be created in the underground cavities formed by the nuclear detonations. The terrestrial ecosystem will be affected by testing due to the creation of new subsidence craters. There is a slight chance of localized onsite effects to plant life. Local freshwater systems will not be significantly affected by additional radioactivity derived from execution of the proposed test program. Slight adverse environmental effects cannot be avoided. (Daniels-Florida)
W74-05811

PAPER'S POLLUTION PROBLEMS,
H. V. L. Bloomfield.
American Forests, Vol 77, p 10-13, 41-43, November 1971. 3 photo, 3 chart.

Descriptors: *Pulp wastes, *Wood wastes, *Paper industry, *Pulp and paper industry, Chemical wastes, Organic wastes, Water pollution sources, Waste water treatment, Water reuse, Environmental sanitation, Costs, Economic feasibility, Financial feasibility, Industries, Biological treatment, Water pollution treatment, Recycling, Odor, Air pollution.

The total waste load originating from the paper industry represents twenty-seven percent of the total pollutional load from manufacturing. Per capita paper and paperboard consumption is five-hundred and seventy-three pounds per year. Paper industries lead all other industries on expenditures for pollution. By 1969 eighty percent of the facilities had some kind of waste water facility. Mills responsible for forty-one percent of the total output gave their wastewater secondary treatment. However ten percent of the mills now in operation can never meet any anti-pollution standards. The wastes of the pulp and paper industry, except for odor, are biodegradable. The industry's pollution comes from dumping too much of these harmless materials, too much for nature to handle. Extensive re-cycling has been proposed, but its chief value seems to be in anti-littering. About twenty percent of paper output is recycled, but the flushing out of the inks and coatings adds to paper mill pollutions. So far there is no known way to get rid of the pulping odor. As little as one to twenty parts per billion of air can be detected. Systems that make progress toward ending this pollution are prohibitively expensive. (Sperling-Florida)
W74-05817

THE MIXING CHARACTERISTICS OF SUMMERGED MULTIPLE-PORT DIFFUSERS FOR HEATED EFFLUENTS IN OPEN CHANNEL FLOW,
Iowa Univ., Iowa City. Dept. of Mechanics and Hydraulics.
J. R. Argue.
Available from the National Technical Information Service as PB-230 243 $10.00 in paper copy, $1.45 in microfiche. M Sc Thesis, May 1973. 124 p, 26 fig, 16 tab, 32 ref, 3 append. OWRR A-040-IA (1).

Descriptors: *Jets, *Mixing, *Diffusion, *Dispersion, Heated water, *Thermal pollution, Hydraulic models, *Path pollutants, Waste water(Pollution), Stratified flow, Outlets, *Open channel flow.

The behavior of heated water jets discharging into a shallow, co-flowing environment was studied in a model which simulated the flow of cooling water from a prototype multiport diffuser discharging into a river or ocean current. The relative effects of jet interaction and surface distortion were considered. The port spacing distance was the most significant variable. Criteria for differentiating among well-mixed flows, moderately well-mixed flows and stratified flows were determined together with the relationship between mixing and distance. A procedure for designing multiport diffuser installations is suggested. (See also W74-05822) (Knapp-USGS)
W74-05821

VERTICAL MIXING OF HEATED EFFLUENTS IN OPEN-CHANNEL FLOW,
Iowa Univ., Iowa City. Dept. of Mechanics and Hydraulics.
E. J. Schiller.
Available from the National Technical Information Service as PB-230 212 $11.50 in paper copy, $1.45 in microfiche. Ph D Thesis, July 1973. 146 p, 41 fig, 5 tab, 30 ref, 2 append. OWRR A-040-IA (2).

Descriptors: *Thermal pollution, *Mixing, *Heated water, Hydraulic models, Mathematical models, Path of pollutants, Turbulent flow, Turbulence, Stratified flow, Water temperature, Dispersion, Diffusion, Computer programs, *Open channel flow.

A method for prediction of vertical mixing of heated surface effluents in the far-field mixing region was studied using laboratory flume experiments which covered a range of flows from well mixed to nearly stable stratified conditions. The velocity and depth of flow, as well as the temperature difference and discharge ratio between ambient and effluent flows were varied to simulate the range of conditions commonly encountered. Temperatures were recorded downstream by mobile thermistors. Velocity measurements were also taken for selected runs. From the data together with an analysis based on the convection-diffusion equation, it is possible to determine (1) the distance for nearly complete mixing, (2) a bulk mixing coefficient for moderately and rapidly mixing flow and (3) the vertical distribution of the overall vertical heat transfer coefficient at cross sections downstream. The buoyancy effects were absorbed into the transfer coefficient. The less dense water inhibits mixing near the surface, and creates reduction in mixing throughout most of the depth for the more stratified flows. For the rapidly mixing flows, the vertical heat transfer coefficient agreed closely with the turbulent momentum transfer coefficient. Predictions of the downstream temperature profiles were obtained using a finite difference representation of the steady state convection-diffusion equation. The predicted profiles agreed closely with the experimental ones. (See also W74-05821) (Knapp-USGS)
W74-05822

THREE-DIMENSIONAL TURBULENT DIFFUSION FROM POINT SOURCES OF THERMAL POLLUTION IN A RECTANGULAR OPEN CHANNEL,
Delaware Univ., Newark. Dept. of Chemical Engineering.
D. C. Prieve.
Available from the National Technical Information Service as PB-230 220 $18.50 in paper copy, $1.45 in microfiche. Master of Chemical Engineering Thesis, May 1973. 293 p, 35 fig, 18 tab, 69 ref, 9 append. OWRR A-015-DEL (2).

Descriptors: *Heat transfer, *Path of pollutants, *Mixing, *Dispersion, *Diffusion, Turbulent flow, *Thermal pollution, Convection, Mass transfer, *Open channel flow.

Some simple forms of turbulent constitutive relations, which have been useful in pipe flows, are applied to the case of turbulent flow in a rectangular open channel. Procedures are given for extracting the constitutive parameters from the measured velocity or temperature field. Thermal profiles resulting from a concentrated source of heat located well away from the boundaries may be described by assuming a direct proportionality between the turbulent energy flux and the time-averaged thermal gradient. The proportionality constant, or eddy conductivity, must be allowed to assume a different value for each of the three energy flux components, but variations with position may be ignored. Incorporating this constitutive equation with the energy equation, and neglecting axial diffusion, the product of eddy conductivity and distance from the source is uniquely and predictably related to the variance of the time-averaged temperature profile along an axis appropriate to that conductivity component. This allows the determination of both cross-sectional components of the apparent eddy conductivity, using the minimum number of local temperature measurements necessary to establish both variances. Comparison of the momentum diffusivity with the thermal diffusivities reveals these two quantities to be of nearly the same magnitude. (Knapp-USGS)
W74-05823

HYDRAULICS AND THERMAL DISPERSION IN AN IRREGULAR ESTUARY,
General Electric Co., Philadelphia, Pa. Re-Entry and Environmental Systems Div.
R. R. Boericke, and D. W. Hall.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10282, p 85-102, January 1974. 11 fig, 10 ref, append.

Descriptors: *Dispersion, *Path of pollutants, *Estuaries, *Thermal pollution, Mixing, Tides, Tidal waters, Thermal powerplants, Water temperature, *Mathematical models, Diffusion, Finite element analysis, Open channel flow, Model studies.

A model of thermal pollution in an irregular estuary is based on the open-channel hydraulics equations in two dimensions. Coordinate transformation is used to map the irregular shoreline into a rectangular computational space, thereby simplifying treatment of boundary conditions. The hydraulic flow field is calculated separately from the temperature field, due to the large difference in stable step size for the two calculations. The results of the hydraulics calculation, which become periodic after about one and one-half tidal cycles, are stored on magnetic tape for use in the temperature calculation. The temperature field arising from a powerplant thermal discharge requires 15 or more tidal cycles to become periodic, due to the gradual diffusion of heat away from the outfall by oscillating tidal currents. Sample temperature calculations are presented which illustrate the effect of the oscillatory tidal flow on the temperature distribution near the outfall. (Knapp-USGS)
W74-05828

LONGITUDINAL DISPERSION IN SATURATED POROUS MEDIA,
California Univ., Davis. Dept. of Water Science and Engineering.
M. A. Marino.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10296, p 151-157, January 1974. 3 fig, 5 ref, append.

Descriptors: *Path of pollutants, *Groundwater movement, *Dispersion, *Porous media, Equations, Saturated flow, Equations, Water pollution sources, Seepage.

Analytical solutions were developed for two problems of longitudinal dispersion within semi-infinite, nonadsorbing, homogeneous, isotropic media in unidirectional flow fields. The source concentrations consist of variable inputs of contaminants. The solutions predict the distribution of contaminants resulting from the variable source concentrations. Two numerical examples are presented. (Knapp-USGS)
W74-05832

DIFFUSION AND DISPERSION IN OPEN CHANNEL FLOW,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
A. C. Miller, and E. V. Richardson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10298, p 159-171, January 1974. 8 fig, 2 tab, 13 ref, append.

Descriptors: *Diffusion, *Dispersion, *Open channel flow, *Path of pollutants, Mixing, Turbulence, Flow resistance.

The relationships of lateral turbulent diffusion and longitudinal dispersion coefficients to the parameters that make up the structures of flows were studied experimentally. The resistance to flow for these runs varied from 10.6 to 4.4. The relation for the lateral turbulent diffusion coefficient was not affected by the secondary circulation that was present in all of the flows and is the same as that for a large range of flow conditions. The dispersion coefficient varied with resistance to flow and the average velocity. Longitudinal diffusion, which depends on the turbulence of the flow, was an insignificant factor in the dispersion coefficient as compared to the distribution of the local mean velocity in the lateral and vertical direction. (Knapp-USGS)
W74-05833

NORFOLK HARBOR DISPOSAL STUDY: HYDROGEOLOGIC STUDY OF NANSEMOND CITY DISPOSAL AREA.
Army Engineer District, Norfolk, Va.
April 1973. 10 p, 3 fig, 13 ref, 3 append.

Descriptors: *Hydrogeology, *Atlantic coastal plain, *Virginia, *Spoil banks, *Dredging, Water pollution control, Harbors, Groundwater.
Identifiers: Nansemond(Va), *Norfolk Harbor(Va).

The Craney Island Disposal Area established in 1953 to contain Norfolk Harbor dredge spoil will be filled to capacity within 10 years. At that time an additional spoil area will be needed for disposal of dredge spoil from maintenance dredging of Norfolk Harbor. Current environmental standards prohibit the disposal of contaminated dredge spoil in open waters. Consequently, the Norfolk District is studying viable disposal alternatives including disposal on low-lying ground in Nansemond City. The feasibility of using the Nansemond City Disposal Area was studied by defining the hydrogeology of the area. The study is also required to provide engineering data needed for design of pollution control measures, if required, to maintain the freshwater environment. The study area is located on the Atlantic Coastal Plain, a gently seaward sloping lowland characterized by a series of lowland flats and scarps that rise westward from the sea. The Coastal Plain is underlain by a series of unconsolidated sands and clays which range from Cretaceous to Recent. These sediments vary considerably in character over wide areas. They are usually covered by a few feet of peat. Many small lenses of sand function as shallow groundwater aquifers and domestic water supply for the surrounding area. These Pleistocene sediments, from 25 to 50-feet thick, are underlain by 150 to 200 feet of late Miocene, Yorktown Formation, shallow marine sediments. These sediments contain beds of silt and clay which are very low in permeability and function as confining beds for the Pleistocene aquifers above. (Knapp-USGS)
W74-05847

PERMEATION OF UNCHARGED ORGANIC MOLECULES AND WATER THROUGH TOMATO ROOTS,
Department of Agriculture, South Perth (Australia).
For primary bibliographic entry see Field 3F.
W74-05852

VORTEX CONTAINMENT OF SUBMERGED JET DISCHARGE,
Connecticut Univ., Storrs. Dept. of Mechanical Engineering.

For primary bibliographic entry see Field 8B.
W74-05912

THE SPREADING AND TRANSPORT OF OIL SLICKS ON THE OPEN OCEAN IN THE PRESENCE OF WIND, WAVES, AND CURRENTS,
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
G. A. Waldman, R. A. Johnson, and P. L. Smith.
Available from NTIS as AD-765 926, $3.75 paper copy, $1.45 microfiche. Final Report No AVSD-0068-73-RR, July 1973. 70 p, 25 fig, 5 tab, 33 ref. DOT-CG-20, 617-A.

Descriptors: *Oil spills, *Oil pollution, Dye releases, Turbulence, Models, Winds, Waves(Water), Currents(Water), Ocean waves, Ocean currents, *Pollutants.
Identifiers: Spreading, Oil slick transport, Pollutant transport.

Calculations have been made of the spreading and transport of oil slicks on the open ocean. New and available results have been used for the spreading of oil on calm waters, and Okubo's correlation of dye-release experimental data has been invoked for the spreading caused by water turbulence. In the presence of combined effects of spreading and transport by various environmental influences, a simple superposition model has been employed. Limited comparisons of the results of these calculations have been made with data from the San Clemente and Arrow spills, and the Chevron and Santa Barbara leaks. Insufficient data on winds, waves, and currents and lack of knowledge of the rates of dispersion caused by surface turbulence and the evaporation of volatile components, as well as the limitations of the present analytical models regarding coupled spreading and transport effects, preclude making definitive calculations and comparisons. Presently available analytical and experimental results can be applied to predict oil slick spreading and transport under many conditions, but further work is needed to more precisely define the limits of validity of these methods. (Sinha-OEIS)
W74-05919

BREAKDOWN OF BENZO(A) PYRENE BY MICROORGANISMS IN WASTE WATERS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
M. N. Poglazova, A. Ya., Khesin, G. E.
Fedoseeva, M. N. Meisel', and L. M. Shabad.
Dokl Akad Nauk SSSR SER Biol. Vol 204, No 1, p 222-225. 1972.
Identifiers: Microorganisms, *Pyrenes, Waste waters, Water pollution sources, *Industrial wastes, *Aromatic hydrocarbons, *Degradation(Decomposition).

The microflora of industrial waste polluted with polycyclic aromatic hydrocarbons (PAH), including benzo(a)pyrene, can break down large quantities of these hydrocarbons. Consequently, aromatic compounds are constantly being naturally decomposed in waste waters. The breakdown of PAH by microflora of waste waters can apparently be intensified by adding cultures of microorganisms actively oxidizing PAH.--Copyright 1973, Biological Abstracts, Inc.
W74-05943

5C. Effects Of Pollution

AN INVESTIGATION OF THE EFFECTS OF DDT AND OTHER CHLORINATED HYDROCARBONS ON THE GROWTH OF EURYHALINE MICROALGAE,
Maine Univ., Orono. Dept. of Botany; Maine Univ., Orono. Dept. of Oceanography; and Maine Univ., Orono. Dept. of Zoology.
R. L. Vadas.
Available from the National Technical Information Service as PB-229 680, $5.75 in paper copy, $1.45 in microfiche. Completion Report, June 1972. 48 p, 17 fig, 2 tab, 5 ref. OWRR A-021-ME(1).

Descriptors: *DDT, *Chlorinated hydrocarbon pesticides, Algae, *Dieldrin, Water pollution effects, Growth rates, Inhibition, Cytological studies.
Identifiers: *Euryhaline microalgae, *Porphyridium sp., *Platymonas subcordiformis, *Brachiomonas submarina.

This research project was initiated to determine the effects of chlorinated hydrocarbons at various concentrations on the growth of euryhaline microalgae, to determine if resistance to DDT occurs in algae with short generation times and with wide tolerances to naturally occurring environmental conditions, and to determine photosynthetic rates for algae treated with chlorinated hydrocarbons. Extensive studies on the effects of DDT on the growth of Platymonas subcordiformis indicate that some degree of resistance occurs naturally in the alga and that depressions in the carrying capacities and in growth rates, especially, in the form of lags, are common at sublethal levels. Growth rates were adversely affected by DDT concentrations at 100 to 200 ppb. At 500 ppb cells never recovered within the experimental period (7 to 10 days). Studies on the effects of DDT at varying salinity levels suggest that cells are less resistant to DDT at higher salinities (22 to 30 PPT). Other eurytolerant microalgae treated with an initial dose of DDT include Porphyridium sp. and Brachiomonas submarina. Both species were more presistant to DDT than P. subcordiformis. B. submarina was not affected by 500 ppb DDT. Porphyridium sp. was unaffected by DDT concentrations of 10,000 ppb. Both log cells of P. subcordiformis and Porphyridium sp. were tested with dieldrin in one-shot treatments. 100 ppb and 10,000 ppb did not inhibit these cells. Daily additions of DDT were tested on P. subcordiformis. DDT added at the beginning of either the light or dark cycle was inhibitory and reduced growth rates at 25 to 50 ppb. Experiments are currently in progress to determine the effect of the diurnal growth rhythm on the sensitivity of cells of P. subcordiformis to DDT.
W74-05407

INVESTIGATIONS OF FRESHWATER SURFACE MICROLAYERS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W74-05410

STAFF REPORT ON COAL GASIFICATION: PROCESSES AND EFFECTS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W74-05416

WATER QUALITY CRITERIA, SECOND EDITION.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5A.
W74-05417

OCCURRENCE, RADIOACTIVITY, AND DIVERSITY, OF WINNIPEG RIVER BENTHIC ORGANISMS IN THE VICINITY OF WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
R. E. Ireland, J. E. Guthrie, and A. G. Robinson.
Available from NTIS, Springfield, Va., as Rept. AECL-4421, $5.45 per copy, $1.45 microfiche. Report No. AECL-4421, July 1973. 108 p, 10 fig, 20 tab, 4 append.

Descriptors: *Nuclear powerplants, *Radioactivity, Effluents, *Canada, Surveys, Assay, Benthos, Insects, Aquatic insects, Water pollution, Biota, Aquatic life, Water quality.
Identifiers: *Winnipeg River.

The abundance and total beta activity of the benthic insects in the Winnipeg River adjacent to the Whiteshell Nuclear Research Establishment (WNRE) were determined during 1966 and 1967. During the study, potential indicator species were identified and a number of aquatic insect species, not previously reported in Manitoba, were collected. Tubificid worms, Chironomidae larvae, and Hexagenia spp. naiads were the most abundant species in the total of 20 benthic taxa collected. The radioactivity concentration ratios (total beta activity of organism/total beta activity of water) of these species was about 2; therefore, any of them could serve as indicators of change in the level of radioactivities in the aquatic biota upstream and downstream of the WNRE liquid effluent outfall. Benthic-community diversity indices developed from information theory are finding increasing application as a method of assessing water quality. The range of individual diversity indices (d) was 2.45 to 2.94, suggesting that the section of the river beside WNRE is mesotrophic. The information will serve as a baseline with which to compare any future changes in the benthic communities of the river. (Houser-ORNL)
W74-05418

ASSESSMENT OF POTENTIAL RADIOOLOGICAL HEALTH EFFECTS FROM RANDON IN NATURAL GAS,
Office of Radiation Programs, Washington, D.C.
R. H. Johnson, Jr., D. E. Bernhardt, N. S. Nelson, and H. W. Calley, Jr.
Available from NTIS, Springfield, Va., as Rept. No. EPA-520/1-73-004. $5.45 per copy, $1.45 microfiche. Report No. EPA-520/1-73-004, Nov. 1973. 71 p, 3 fig, 15 tab, 75 ref.

Descriptors: Radium radioisotopes, Radioactivity, Radioactivity effects, Public health, Population, Water pollution, Water pollution sources, Natural gas, Bioassay, Biology, Toxicity, Cost-benefit analysis.
Identifiers: *Randon.

Natural gas contains varying amounts of radon-222 which becomes dispersed in homes when natural gas is used in unvented appliances. Radon decays to alpha-emitting daughter products which can contribute to lung cancer when inhaled and deposited in the respiratory system. For the average use of unvented kitchen ranges and space heaters, the tracheobronchial dose equivalent to individuals was estimated as 15 and 54 mrem/yr, respectively, or 2.73 million person-rems/yr to the United States population. A review of exposure conditions, lung model parameters, dose conversion factors, and health effect factors indicated this population dose equivalent could potentially lead to 15 deaths a year from lung cancer. This represents only 0.03 to 0.08 percent of normal lung cancer mortality. Since control of radon levels in gas would cost over $100 million for each reduction of one health effect, it was concluded that a requirement for such controls would not be cost effective on a national basis. (Houser-ORNL)
W74-05420

DOSE AND RISK CONSIDERATIONS FOR THE RELEASE OF I-131 AT SPECIAL SITES,
Kernforschungszentrum, Karlsruhe (West Germany). Institut fuer Neutronenphysik und Reaktortechnik.
A. Bayer.

Available from IAEA, PO Box 433, New York, N.Y., as Report STI/PUB-342; $29.00 per copy. Presented at IAGA Symposium on Principles and Standards of Reactor Safety, Held in Zurich, Federal Republic of Germany, Feb 5-9, 1973. Report STI/PUB-342, Feb 1973. 25 p, 8 fig, 3 tab, 29 ref. (CONF-73-0217).

Descriptors: *Nuclear powerplants, Effluents, *Iodine, Critical path method, *Radioactivity, Environmental effects, Ingestion(Biological), Distribution patterns, Meteorology, Cost benefit analysis, Food chains, Population, Public health, *Radioisotopes.
Identifiers: *Germany(Upper Rhine Valley).

Dose and risk considerations for the release of I-131 from nuclear installations are studied for the Upper Rhine Valley between Basel and Mainz, where an accumulation of nuclear power plants is expected and effects of superposition must be taken into account. I-131 is taken as the critical isotope. Incorporated iodine is deposited in the thyroid gland. The possible effect of this radiological burden is thyroid carcinoma. The age dependent inhalation dose factors and age dependent ingestion dose factors are shown, likewise the known risk factors for thyroid carcinoma. In case of normal release of I-131 from nuclear installations, the resulting thyroid doses are calculated and compared with the 90 mrem/a criterion. The average annual releases from accidental events, derived from an accidental release frequency relation, are used to calculate the average doses from accidental release and to compare them with the doses from normal release. The resulting risks from accidental releases are calculated and compared with the natural risk of thyroid carcinoma. (H
W74-05421

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF R. E. GINNA NUCLEAR POWER PLANT UNIT I, ROCHESTER GAS AND ELECTRIC CORPORATION.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Rept. No. Docket 50244-221. $7.60 per copy, $1.45 microfiche. Report No. Docket 50244-221, Dec 1973. 298 p, 45 fig, 53 tab, 192 ref, 1 bib, 6 append.

Descriptors: *Lake Ontario, *Nuclear powerplants, Effluents, Environmental effects, Administrative agencies, *Comprehensive planning, Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Fish, *New York.
Identifiers: *Environmental impact statements, *Pressurized water reactors.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the operation of the T. E. Ginna Nuclear Power Plant Unit 1. The power plant is located on Lake Ontario in Wayne County, New York, and uses a pressurized-water reactor. The exhaust steam will be condensed by once-through flow of water obtained from and discharged to Lake Ontario. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion was to issue a full-term operation license for the facility subject to the following technical specification requirements: (1) Define a comprehensive environmental monitoring program. (2) Reduce or eliminate fish impingement on screens. (3) Monitor and control the use of chlorine. (4) Plan plant shutdowns to reduce cold-shock effect on fish. (5) Continue studies of any damage to Lake Ontario resulting from plant operations. (6) Provide analysis and course of action to alleviate any irreversible damages detected. (Houser-ORNL)
W74-05422

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CATAWBA NUCLEAR STATION, UNITS 1 AND 2, DUKE POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Rept. No. Docket 50414-56; $10.60 per copy, $1.45 microfiche. Rept. No. Docket 50413-56, Dec 1973. 385 p, 43 fig, 70 tab, 129 ref, 12 append.

Descriptors: *Nuclear powerplants, Effluents, Environmental effects, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *South Carolina.
Identifiers: *Pressurized water reactors, *Lake Wylie(S.C.), *Environmental Impact Statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed issuance of construction permits for construction of the Catawba Nuclear Station, Units 1 and 2. The nuclear station is located on Lake Wylie, York County, South Carolina, and will employ two pressurized water reactors cooled by water through closed-cycle wet cooling towers with water from and discharged to Lake Wylie. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled.ironmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. AEC will issue construction permits subject to conformity with certain stipulations regarding construction activities, surveys, and monitoring to prevent significant adverse environmental impact. (Houser-ORNL)
W74-05423

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1, SOUTHERN CALIFORNAI EDISON COMPANY AND THE SAN DIEGO GAS AND ELECTRIC COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Rept. No. Docket 50206-237; $10.60 per copy, $1.45 per microfiche. Report No. Docket 50206-237, Oct 1973. 326 p, 28 fig, 41 tab, 180 ref, 7 append.

Descriptors: *Nuclear powerplants, Effluents, Environmental effects, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *California, Pacific Ocean.
Identifiers: *Environmental Impact Statements, *Pressurized water reactors, San Diego(Calif).

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the conversion of a provisional operating license into a full operating license for the San Onofre Nuclear Generation Station, Unit 1. The power station is located on the Pacific Coast in the State of California, County of San Diego. The unit employs a pressurized-wtor cooled by a once-through flow of water obtained from and discharged to the Pacific Ocean. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It was concluded to convert the provisional license to a full-term operating license subject to the following limitation: (1) Define a comprehensive environmental monitoring program; (2) provide analysis and implement a program of remedial action to eliminate detrimental effects found. (Houser-ORNL)
W74-05424

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED LIMERICK GENERATING STATION, UNITS 1 AND 2, PHILADELPHIA ELECTRIC COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Rept. No. Docket 50352-62; $13.60 per copy, $1.45 microfiche. Report No. Docket 50352-62, Nov 1973. 686 p, 47 fig, 59 tab, 304 ref, 9 append.

Descriptors: *Nuclear powerplants, Effluents, Environmental effects, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Pennsylvania.
Identifiers: *Boiling water reactors, *Schuylkill River(Penn), *Perkiomen Creek(Penn), *Environmental Impact Statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed issuance of construction permits for the Limerick Generating Station, Units 1 and 2. The station is located on the Schuylkill River near Pottstown, Pennsylvania, and will employ two boiling water reactors cooled in two natural-draft cooling towers using water from Schuylkill River and Perkiomen Creek and discharged to the Schuylkill River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. AEC will issue construction permits subject to certain stipulated requirements during construction. (Houser-ORNL)
W74-05425

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Report No. Docket 50237-416 and 50349-313; $10.60 per copy, $1.45 microfiche. Report No. Docket 50237-416 and 50349-313, Nov 1973. 432 p, 49 fig, 51 tab, 211 ref, 7 append.

Descriptors: *Illinois, *Nuclear powerplants, Effluents, Environmental effects, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Sesimology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis.
Identifiers: *Boiling water reactors, Kankakee River(Ill), Deplaines River(Ill), *Environmental Impact Statements, *Illinois River(Ill).

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed issuance of a full-term operating license for the Dresden Nuclear Power Station, Unit 2, and continuance of operating license for Unit 3. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It was concluded to issue a full-term operating license for Unit 2 and continue the operating license for Unit 3 subject to the following conditions: (1) complete modifications to radwaste systems, (2) complete technical specifications as required, (3) supply course of action to alleviate any harmful effects or evidence of irretrievable damage detected. (Houser-ORNL)
W74-05426

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE HADDAM NECK (CONNECTICUT YANKEE) NUCLEAR POWER PLANT, CONNECTICUT YANKEE ATOMIC POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Report No. Docket 50213-228; $7.60 per copy, $1.45 microfiche. Report No. Docket 50213-228, Oct 1973. 324 p, 38 fig, 49 tab, 191 ref, 3 append.

Descriptors: *Connecticut, *Nuclear powerplants, Effluents, Environmental effects, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Connecticut River.
Identifiers: Pressurized water reactors, Haddam Neck(Conn), *Environmental Impact Statements.

The proposed action for the Haddam Neck Nuclear Power Plant is a conversion of the provisional operating license to a full-term operating license. The site is on the east shore of the Connecticut River, about 22 miles south-southeast of Hartford and about 16 miles north of Long Island Sound. The reactor is a pressurized water type cooled by water from and returned to the Connecticut River. This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the operation of the Haddam Neck Nuclear Power Plant. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to convert the provisional license to a full-term operating license subject to the following limitations: (1) continue studies to prevent fish entrainment on screens, (2) identify plant influences on algae, (3) determine Menhaden losses through the cooling system, (4) define and environmental monitoring program for assay of effects during operation. (Houser-ORNL)
W74-05427

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF GRAND GULF NUCLEAR STATION UNITS 1 AND 2, MISSISSIPPI POWER AND LIGHT COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Report No. Docket No. 50416-42; $10.60 per copy, $1.45 microfiche. Report No. Docket 50416-42, Aug 1973. 478 p, 33 fig, 75 tab, 184 ref, 5 append.

Descriptors: *Mississippi River, *Nuclear powerplants, Effluents, *Environmental effects, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Mississippi.
Identifiers: *Boiling water reactors, *Environmental Impact Statements.

The Grand Gulf Nuclear Power Station is located in Claiborne County, Mississippi, on the east bank of the Mississippi River approximately 25 miles south of Vicksburg. The station will employ two boiling water reactors. The turbine steam condensers will be cooled by water circulated through wet, natural-draft cooling towers with makeup and blowdown water taken from and discharged to the Mississippi River. This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction of the Grand Gulf Nuclear Station Units 1 and 2. Environmental impacts are assessed and after consideration of alternatives and environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue a construction permit for the facility subject to the following conditions: (1) Implement monitoring programs for environmental effects; (2) control unnecessary impacts from construction; (3) study intake velocity of water; (4) provide information on entrainment and impingement of biota in the intake; (5) control the residual chlorine concentrations; (6 control gaseous radioactive effluents; and (7) control use of corrosion inhibitors. (Houser-ORNL)
W74-05428

A STOCHASTIC STUDY ON THE CONCENTRATION PROCESS OF RADIOACTIVE SUBSTANCES TO AQUATIC ORGANISMS,
Kyoto Univ. (Japan). Dept. of Sanitary Engineering.
For primary bibliographic entry see Field 5B.
W74-05429

RESPONSE OF RIVER WATER TO BIOCHEMICALLY DEGRADABLE SUBSTANCES IN PULP MILL WASTE WATER (ODEZVA REKY NA BIOCHEMICKY ODBOURATELNE LATKY V ODPADNICH VODACH Z CELULOZEK),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5B.
W74-05431

EXPERIMENTAL STUDY OF THE EFFECT OF OIL ON SOME REPRESENTATIVES OF BENTHOS IN THE CASPIAN SEA,
Akademiya Nauk Azerbaidzhanskoi SSR, Institut Zoologii.
A. G. Kasymov, and A. D. Aliev.
Water, Air, and Soil Pollution, Vol 2, No 2, p 235-245, June 1973. 11 fig, 3 ref.

Descriptors: *Benthic fauna, Water pollution effects, *Toxicity, *Bioassay, Weight, Growth rates, Evolution, Worms, Mollusks, Oligochaetes, *Oil.
Identifiers: *Crude oil, *Caspian Sea, Macroinvertebrates.

Experimental studies of the influence of crude oil on bottom fauna in the Caspian Sea were conducted in crystallizators and aquariums. Oil concentrations varing from 0.2 to 4.0 mg/l were used, with water temperature of 19.3 to 24.4 C and dilute O2 varying from 4.5 to 7.0 mg/l. Worms, oligochaetes, and mollusks were used in the experiments. Under high concentrations of oil (higher than 3 to 5 mg/l) the animals initially did not change weight and then lost weight and perished. In a weak solution of oil (below 1 mg/l) a speed up in normal evolution, growth, and reproduction took place in the animals. (Mortland-Battelle)
W74-05440

FLOCCULATION OF SUSPENDED SEDIMENT IN THE SEA,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5B.
W74-05441

THE PRODUCTION OF PARTICLES IN THE SURFACE WATERS OF THE OCEAN WITH PARTICULAR REFERENCE TO THE SARGASSO SEA,
Bedford Inst., Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 5B.
W74-05453

BACTERIAL DYNAMICS IN TWO HIGH-ARCTIC LAKES,
McGill Univ., Montreal (Quebec). Dept. of Biology.
K. C. Morgan, and J. Kalff.
Freshwater Biol. Vol 2, No 3, p 217-228, 1972. Illus.
Identifiers: *Arctic lakes, Bacterial dynamics, Cycles, *Eutrophication, Glucose, Lakes, *Phytoplankton, Absorption, *Heterotrophic bacteria, Oligotrophic lakes, *Canada(Char Lake-Meretta Lake).

The heterotrophic planktonic bacteria were studied by direct microscope count and the enzymatic uptake of 14C labelled glucose which generally conformed to Michaelis-Menten kinetics. Bacterial numbers and activity in the oligotrophic Char Lake, Canada, ranged from 0.1 to 2lx 10 to the 8th power bacteria/l and a maximum uptake velocity (V max) of 1-8 x 10 to the -3rd power microgram glucose 1 to the -1 power h to the -1 power. Meretta Lake received waste water from the Department of Transport Base at Resolute and this eutrophication was reflected in higher bacterial numbers of 2-80 x 10 to the 8th power/l and Vmax of 0.1 x 10 to the -1 power-7.5 x 10 to the -1 power microgram glucose 1 to the -1 power h to the -1 power. The Vmax per cell in Char Lake was 3 x 10 to the -11 power microgram glucose 1 to the -1 power h to the -1 power and changed little between the period of solid ice cover in May and ice-free conditions in Aug. Bacterial cycles could not be related to phytoplankton cycles in either lake. Comparison of kinetic data from several lakes suggested a relationship between the bacterial uptake rate of glucose and phytoplankton production. Both bacterial numbers and activity in Char Lake

may be very close to the minima to be expected in undisturbed freshwater environments.--Copyright 1973, Biological Abstracts, Inc.
W74-05458

THE PERSISTENCE AND MOVEMENT OF PICLORAM AND 2,4,5-T IN SOILS,
North Carolina State Univ., Raleigh. Pesticide Residue Research Lab.
For primary bibliographic entry see Field 5B.
W74-05459

EFFECTS OF PH AND TEMPERATURE ON THE FATTY ACID COMPOSITION OF BACILLUS ACIDOCALDARIUS,
Consiglio Nazionale delle Ricarche, Naples (Italy). Laboratorio di Chimica e Fisica di Molecole di Interesse Biologico.
M. De Rosa, A. Gambacorta, and J. D. Bu'Lock.
Journal of Bacteriology, Vol. 117, No. 1, p 212-214, January 1974. 1 tab, 8 ref.

Descriptors: *Hydrogen ion concentration, *Cytological studies, *Temperature, Lipids, *Gas chromatography, Cultures, Aeration, Growth rates, Metabolism, Aerobic bacteria.
Identifiers: *Fatty acids, *Bacillus acidocaldarius, Chemical composition, Methyl esters, 11-Cyclohexylundecanoic acid, 13-Cyclohexyltridecanoic acid, Anteiso-heptadecanoic acid, Isoheptadecanoic acid, Thin layer chromatography, Sample preparation.

The fatty acid composition of lipid extracts from cells of Bacillus acidocaldarius grown at temperatures of 50 to 70C and pH values of 2 to 5 was determined by gas chromatography of the methyl esters. The most abundant fatty acids are 11-cyclohexylundecanoic and 13-cyclohexyltridecanoic, followed by anteiso- and iso-heptadecanoic; unsaturated acids are absent. Highly aerated cultures produce more of the iso and anteiso acids and less of the cyclohexyl acids. The effects of temperature and pH are interdependent; at lower pH, increasing temperature raises the proportion of the iso and anteiso acids, but at higher pH the effect of increasing temperature is reversed and the proportion of the cyclohexyl acids is increased. (Mortland-Battelle)
W74-05461

ACETYLCHOLINESTERASE TOXICITY OF MALATHION AND ITS METABOLITES,
Gulf Coast Research Lab., Ocean Springs, Miss.
W. W. Walker, and B. J. Stojanovic.
Journal of Environmental Quality, Vol. 2, No. 4, p 474-475, October-December 1973. 1 tab, 7 ref.

Descriptors: *Pesticide toxicity, *Microbial degradation, Inhibition, Enzymes.
Identifiers: *Metabolites, *Malathion, *Acetylcholinesterase, Malathion half ester, Malathion dicarboxylic acid, Potassium dimethyl phosphorothioate, Potassium dimethyl phosphorodithioate, *Arthrobacter, Warburg apparatus, Manometers, Detoxification, In vitro tests.

Malathion, under the vitro laboratory conditions, is readily degraded by an Arthrobacter species to four metabolites - malathion half-ester, malathion dicarboxylic acid, potassium dimethyl phosphorothioate, and potassium dimethyl phosphorodithioate. However, it is not clear whether or not this degradation represents a simultaneous detoxication of the malathion molecule. With this in mind, the relative toxicity of each of the four metabolites to bovine acetylcholinesterase was determined manometrically with the Warburg apparatus. Malathion half-ester retained roughly one-third the enzyme toxicity of unaltered malathion, while the other metabolites showed essentially no enzyme inhibition. It was concluded that while microbial conversion of malathion to malathion half-ester may well represent complete malathion degradation, it does not constitute complete insecticide detoxication. (Little-Battelle)
W74-05466

ALGAE IN THE SPOON RIVER, ILLINOIS 1971-1972,
Illinois State Water Survey, Peoria. Water Quality Section.
For primary bibliographic entry see Field 5B.
W74-05483

THE EFFECTS OF SELECTED HERBICIDES ON BACTERIAL POPULATIONS IN AN AQUATIC ENVIRONMENT,
Arizona Univ., Tucson. Dept. of Microbiology and Medical Technology.
R. N. Ferebee, and R. K. Guthrie.
Water Resources Bulletin, Vol 9, No 6, p 1125-1135, December 1973. 4 fig, 4 tab, 12 ref.

Descriptors: *Paraquat, *2, 4, 5-T, Aquatic bacteria, Population, *Bioassay, Water pollution effects, *Herbicides, Pesticide residues, Degradation(Decomposition), Sulfur compounds, Chlorinated hydrocarbon pesticides, Aquatic environment, Water temperature, Hydrogen ion concentration, Dissolved oxygen, Cultures, Laboratory tests, Water analysis, Plant growth, Aquatic algae, Chemical analysis, Isolation, Pseudomonas, Streptococcus, Salmonella.
Identifiers: *Diuron, *Heterotrophic bacteria, *Bacterial physiology, Bacterial growth, Mesophilic bacteria, Culture media, Oxygen consumption, Bacillus, Achromobacter, Micrococcus, Staphylococcus, Flavobacterium, Sarcina, Escherichia, Alcaligenes, Aerobacter, Brevibacterium, Chromobacterium, Serratia, Streptomyces, Proteus.

Heterotrophic, mesophilic bacteria derived from, and maintained in, a freshwater environment where subjected to three classes of her, 2,4,5-trichlorophenoxyacetic acid, and paraquat, used as water soluble solutions, were added (0.7 and 1.4 mg/1) to a laboratory culture of bacteria. Total numbers of the bacteria, representing several genera, were monitored for alteration of numbers and types. Temperature, pH, and dissolved oxygen were monitored and the culture medium was tested for residual herbicide. Trichlorophenoxyacetic acid, 2,4, 4-T, did not affect that portion of the bacterial population tested. Increase of bacterial counts as the result of paraquat addition was real, with both direct and indirect effects. Diuron caused a reduction in the total bacterial counts and selective enrichment. The reasons for the observed differences are discussed. The herbicides remained qualitatively measurable for periods up to 3 weeks. (Holoman-Battelle)
W74-05484

NITROGEN TRANSFORMATIONS IN SEDIMENTS AS AFFECTED BY CHEMICAL AMENDMENTS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-05485

EFFECTS OF SEDIMENTATION OF THE ALGAL FLORA OF A SMALL RECREATIONAL IMPOUNDMENT,
Virginia Commonwealth Univ., Richmond. Dept. of Biology.
G. L. Smsel, Jr.
Water Resources Bulletin, Vol 9, No 6, p 1145-1152, December 1973. 1 fig, 3 tab, 8 ref.

Descriptors: *Sedimentation, Environmental effects, *Nutrients, *Aquatic algae, *Standing crops, Primary productivity, Winter, Chemical properties, Physical properties, Phytoplankton, Chlorophyta, Chrysophyta, Chrysophyta, Cyanophyta, Chlorophyll, Silicates, Phosphates, *Virginia, Impoundments, Water sampling, Secchi disks, Photosynthesis, Oxygen, Hydrogen ion concentration, Carbon dioxide, Nitrates, Nitrites, Sulfates, Hardness(Water), Chlorides.
Identifiers: *Photosynthetic rates, Chemical concentration, Ammonium, Orthophosphates, Closterium, Trachelomonas, Desmids, Ulothrix, Mougeotia, Spirogyra, Oedogonium, Rhizoclonium, Stigeoclonium, Zygnema, Desmidium, Volvox, Ooxystis, Chlorococcus, Netrium, Staurastrum, Bulbochaete, Dinobryon, Navicula, Nitzschia, Synedra, Tabellaria, Vaucheria, Lyngbya.

Investigations were initiated to evaluates of sedimentation on the algal composition, primary productivity rates and chemical nutrient concentrations of a 17-acre recreational impoundment in central Virginia. Comparisons during the winter seasons of 1972-1973 indicated that as a result of sedimentation, from lake front home construction, the total numbers of algal genera in the lake decreased from 24 to 16, productivity as measured by C-1402 and total extractable chlorophyll decreased two-fold, and several important nutrients, i.e. NH4-N, Si02 and P04-P increased significantly. (Holoman-Battelle)
W74-05486

TREND SULFACE ANALYSIS AND SEASONAL DISTRIBUTION PATTERNS OF PRIMARY NUTRIENTS AND CHLOROPHYLL IN UNSTRATIFIED GULF COAST ESTUARIES,
Texas Univ., Houston. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-05488

SPECIES INTRODUCTION IN A TROPICAL LAKE,
Washington Univ., Seattle. Dept. of Zoology.
T. M. Zaret, and R. T. Paine.
Science, Vol 182, No 4111, p 449-455, November 2, 1973. 5 fig, 2 tab, 26 ref.

Descriptors: *Lakes, *Predation, *Trophic level, *Food webs, *Food chains, *Tropical regions, Freshwater fish, Aquatic environment, Aquatic populations, Biological communities, Cichlids, Zooplankton, Phytoplankton, Chlorophyta, Mosquitoes, Human diseases, Bacteria, Aquatic insects.
Identifiers: *Piscivores, Cichla ocellaris, *Panama Canal Zone(Gatun Lake), Malaria, Black terns, Kingfishers, Herons.

Probably in early 1967, a piscivore from South America, Cichla ocellaris, was introduced to Gatun Lake in the Panama Canal Zone. As this predator population spread through the lake, the initial effect was dramatic reductions in almost secondary consumers. These species reductions produced, in turn, second- and third-order changes at other trophic levels of the ecosystem. The resulting changes in the lake community can be seen best by examining the general Gatun Lake food wed. The decrease in numbers of the important planktivore Melaniris has resuld in changes within the zooplankton community, as illustrated by the cladoceran Ceriodaphnia. The tertiary-consumer populations, such as tarpon, black terns, kingfishers, and herons, formerly dependent on small fishes for food, appear less frequently in the Cichla areas of the lake. There has also been, possibly, a resurgence of the local mosquito populations (which are malaria vectors), caused by the reduction in the populations of insect-eating fishes. Even the primary producers may be affected by this introduction. Although at present the Gatun Lake ecosystem is undergoing rapid changes, we anticipate an eventual return to some form of equilibrium. However, it will be some time before one can evaluate the permanence or transience of the many changes produced in the trophic levels by the introduction of a single, toplevel predator to this lake system. (Mortland-Battelle)
W74-05492

THE KINETICS OF YEAST GROWTH ON PURE HYDROCARBONS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Microbiological Inst.
For primary bibliographic entry see Field 5B.
W74-05493

EXPERIMENTAL APPROACHES TO LIMNOLOGY - AN OVERVIEW,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5A.
W74-05498

EFFECT OF TEMPERATURE VARIATIONS ON GROWTH, REPRODUCTION, AMINO ACID SYNTHESIS, FAT AND SUGAR CONTENT IN ULVA FASCIATA DELILE PLANTS,
Alexandria Univ. (Egypt).
A. F. Mohsen, A. H. Nasr, and A. M. Metwalli.
Hydrobiologia, Vol 42, p 451-460, September 28, 1973. 5 fig, 11 ref.

Descriptors: *Water temperature, *Thermal stress, *Marine algae, *Plant physiology, Growth rates, Reproduction, Amino acids, Lipids, Marine plants, Sea water, Waves(Water), Currents(Water), Metabolism, Cultures, Germination, Nitrogen, Chlorophyta, Plant growth, Lethal limit.
Identifiers: *Ulva fasciata, Biosynthesis, Mediterranean Sea, Sporophytes, Gametophytes, Plant metabolism.

This work deals with the effect of temperature variations on growth, reproduction, amino acid synthesis, fat and sugar content in Ulva fasciata inhabiting the littoral region of the Mediterranean shore bordering Alexandria. Higher temperatures above 30C have lethal effects on some parts of the algal fronds while the other are rather resistant. The latter are scattered groups of cells, which usually regenerate new plants when carried even to distant parts due to detrimental action of waves and currents. They serve a good means for vegetative propagation and spread better than zooids, which probably perish under such severe and violent conditions. The rate of growth of Ulva indicated by the increase in dry weight and total nitrogen, increases at rising temperature till the latter becomes limiting. Higher temperatures favour the growth and development of sporophytic phases, known by their deep green colouration, while temperatures below 20C favour the production of gametophytes, identified by their yellowish green colour. This might explain why most of the algal crops of Ulva fasciata produced from parental stock (3 crops per year i.e. annually), are sporophytes. Moderate temperatures were favourable for growth, reproduction and the various metabolic processes. Amino acids and sugar contents increase with the rise of temperature, reaching their maximum around 25C, while fat content increases at still lower temperatures. (Mortland-Battelle)
W74-05499

TRANSPORT, FATE AND GEOCHEMICAL INTERACTIONS OF MERCURY, CADMIUM AND OTHER INORGANIC POLLUTANTS IN THE COASTAL LITTORAL-SALT MARSH ENVIRONMENT OF THE SOUTHEASTERN UNITED STATES.
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5B.
W74-05501

OCCURRENCE OF THE PARASITIC BRANCHIURAN, ARGULUS ALOSAE, ON DYING ATLANTIC MENHADEN, BREVOORTIA TYRANNUS, IN THE CONNECTICUT RIVER,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Coastal Fisheries Center.
R. L. Kroger, and J. F. Guthrie.
Trans Am Fish Soc. Vol 101, No 3, p 559-560, 1972.
Identifiers: Argulus-alosae, *Atlantic menhaden infection, *Branchiuran parasite, Brevoortia-tyrannus, *Connecticut River, Dace, Economics, Exhaustion, Rivers, Roach, *Fish parasites, Fish mortality, *Fish diseases.

Dying adult Atlantic menhaden B. tyrannus infested with parasitic branchiuran A. alosae were collected from the Connecticut River at Old Saybrook, Connecticut. Examination of 50 dying menhaden (average 300 mm fork length) showed that each was heavily infested with argulid fish lice. A. alosae is probably of economic importance since heavy infestations of other fish lice species have destroyed entire fish populations in confined environments such as pools and lakes. The abnormal behavior of adult menhaden may have resulted from irritation caused by A. alosae. Menhaden, like roach and dace, may be hypersensitive to attacks by fish lice, and physical exhaustion resulting from parasite irritation caused the mortality of menhaden in the river.--Copyright 1973, Biological Abstracts, Inc.
W74-05526

A STUDY OF WATER-SOLUBLE INHIBITORY COMPOUNDS (ALGICIDES) PRODUCED BY FRESH-WATER ALGAE,
Kentucky Water Resources Inst., Lexington.
D. O. Harris, and M. C. Parek.
Available from the National Technical Information Service as PB-229 831; $4.75 in paper copy, $1.45 in microfiche. Research Report No. 69, November 1973. 34 p, 10 tab, 13 ref. OWRR A-018-KY(6). 14-01-0001-1085, 14-01-0001-1636, 14-31-0001-3017, and 14-31-0001-3217.

Descriptors: Algal toxins, Aquatic algae, Algal poisoning, *Aquatic weed control, *Chlorophyta, Nuisance algae, Algal control, Scum, Water pollution effects, *Algicides, *Inhibitors, *Plant growth regulators.
Identifiers: *Pandorina morum, *Volvox tertius, Staphylococcus aureus.

A complex system of growth inhibitors was observed in the green algae (Volvocaceae). Inhibitors were found in the culture filtrates of some genera which limit their own growth (auto-inhibitors) while others in the family produce substances which check the growth of other genera (heteroinhibitors). These inhibitors were destroyed by autoclaving. It was decided that Pandorina morum, which produced the strongest inhibitor and Volvox tertius, the most sensitive to the inhibitor would make an excellent model system for a study of the chemical and physical properties of these naturally occurring algicides. The algicide could be removed from actively growing cultures about the 12th day after inoculation and maximum inhibition was recorded for the next 18 days. The substance could be diluted several times with the retention of at least partial activity. The inhibitor was relatively stable to high temperatures, moved slowly through a dialysis membrane and possessed anti-bacterial properties in that it inhibited the growth of Staphylococcus aureus. The material was relatively stable when exposed to acid, although exposure to a pH of 2.0 for 30 minutes did destroy most of the activity. The substance was soluble in benzene and chloroform. All attempts to degrade or destroy the inhibitor with the common proteolytic enzymes (trypsin, chymotrypsin and pronase) proved unsuccessful, suggesting the substace is not proteinaceous in nature. In experiments with G-25 and G-50 Sephadex, the inhibitor was retained on the column, indicating a molecular weight of less than 5000. (Grieves-Kentucky)
W74-05537

ENZYME AND TISSUE ALTERATIONS IN FISHES: A MEASURE OF WATER QUALITY,
Louisville Univ., Ky. Dept. of Anatomy; and Louisville Univ., Ky. Water Resources Lab.
D. E. Hinton, M. W. Kendall, and J. C. Koenig.
Available from the National Technical Information Service as PB-229 743; $4.50 in paper copy, $1.45 in microfiche. University of Kentucky Water Resources Research Institute, Lexington, Research Report No. 68, August 1973. 90 p, 64 fig, 3 tab. OWRR A-038-KY(3). 14-31-0001-3517.

Descriptors: *Bioindicators, Biochemistry, Environmental effects, *Enzymes, Fish physiology, *Toxicity, Water quality, *Copper, Fish pathology, Freshwater fish, *Channel catfish, Water pollution effects, Electron microscopy.
Identifiers: *Fish tissues, Fish organs, Enzyme histochemical methods, Pathobiological autopsy, Mercury compounds, *Methyl mercuric chloride.

A variety of freshwater fishes were studied by light and electron microscopy, enzyme histochemical and biochemical methods. The objective was to determine normal structure and function in specific target organs and to compare these to altered states in aquatic pollution. The basic question, 'can fish tissues and enzymes serve as indicators of water quality,' was asked. Microscopic alteration in gill was indicative of copper toxicity at an exposure of 20 parts per billion. Gross and light microscopic alterations were indicative of a single exposure of channel catfish to 15 parts per million of methyl mercuric chloride (CH_3HgCl). Microscopic and correlated biochemical study fingerprinted the alterations in cells at an exposure of 0.67 parts per million CH_3HgCl. The developments of pathobiological autopsy techniques for the assessment of water quality is discussed. (Grieves-Kentucky)
W74-05540

EFFECTS OF DREDGE AND FILL ACTIVITIES IN THE COCOHATCHEE RIVER,
E. T. LaRoe.
The Florida Naturalist, Vol 45, No 6, p 166-169, 1972. 5 photo.

Descriptors: Rivers, *Estuaries, *Water quality, *Mangrove swamps, *Silting, *Channeling, *Florida, Fish, Food chains, Salinity, Drainage, Ecosystem, Plankton, Algae, Water resources, Flow, Dredging, Brackish water.
Identifiers: Hydro period, *Cocohatchee River(Fla).

The Cocohatchee River in southern Florida is an extremely productive river which has been threatened by dredge and fill activities. The river's productivity is due to a delicate and complex balance of several factors, including the quantity and quality of the water, the hydro period, and the mangroves which line its banks. Historically, the Cocohatchee was a meandering creek, which permitted water from the interior to slowly flow down the river. During dry spells, fresh water continued to enter the river from the upland slough. The system was one of gradual change, encouraging a steady state of high productivity. Channelization in the last decade has had varied effects upon the river's ecosystem. First, it has reduced the hydro period, or the period of fresh water flow from the interior. This has changed the steady system of brackish water to one of sudden, extreme changes of fresh and salt water, reducing the river's productivity since many of the organisms cannot tolerate such extreme changes. Channelization also caused the removal of many mangroves, which provide the base for the river's food chain, and destroyed the roots of the mangroves which had previously reduced siltation. (Ritchie-Florida)
W74-05571

AQUATIC ANOMALIES: SYMPTOMS OF A SICK OCEAN,
Florida Conservation Foundation, Winter Park. Environmental Information Center.
For primary bibliographic entry see Field 5B.
W74-05572

A SMALL OIL SPILL,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-05578

RESCUING THE OCEANS, THE NEED FOR IMMEDIATE ACTION,
J-Y. Cousteau.
Current, p 36-39, December 1971.

Descriptors: *Oceans, *Water pollution sources, *Water pollution effects, *Ocean water, *Commercial fishing, Wildlife conservation, Reefs, Aquatic animals, Competition, Economics, Prices, Indirect costs, Economic efficiency, Chemical wastes, Pesticide residues, Public health, Social costs, Aesthetics, Environment, Environmental effects, Coral, Atolls.

The impending destruction of the ocean by pollution and other causes is discussed. Disappearance of coral reefs is due in part to pollution, fishing, and manual destruction. Teams of Tahitian divers destroy ten kilometers of reef a week for shells that are sent to museums and shops around the world. In the past people though the oceans so immense that no harm could be done to it. Air, land, and water pollution are usually discussed as separate entities, but all will end up in the ocean. Already, twenty-five percent of all DDT compounds so far produced are in the ocean. Another reason for the deterioration of the ocean is overfishing. Improved catches in recent years have been due to improved fishing methods, but this year the catch declined. A 1960 study indicated that in eighty years more than eight hundred species had been exterminated by man. Overpopulation and unrestricted competition are the main reasons for the planet's destruction. Remedies suggested are: (1) intensification of research and education of the public; (2) adding the cost of cleaning the environment to product cost; and (3) international cooperation. (Sperling-Florida)
W74-05579

FISH FAUNA IN RIVER NAGARAGAWA AND ITS CHANGE FOR THE LAST SEVERAL YEARS IN RELATION TO RIVER POLLUTION (IN JAPANESE),
Seki High School (Japan).
M. Goto, and T. Goto.
Jap J Ecol, Vol 21, No 5/6, p 254-270, 1972, Illus, English summary.
Identifiers: Actinopterygian, *Japan(Nagaragawa River), Lamprey, Pollution, Rivers, Years, Weirs, *Fish fauna, Goby, Loach, Chubs, Gudgeon, Bullhead, Dace, *Water pollution effects, *Fish populations, *Pulp wastes.

Fish fauna were investigated quantitatively in the middle reaches of the Nagaragawa River, Gifu Prefecture, Japan, from May 1967-Aug. 1971, by using a small weir-trap 'Noboriochi.' As the result 1 sp. of lamprey and 35 spp. of actinopterygian fishes were recorded. The number of fishes collected changed remarkably from year to year. Among the 10 spp. of dominant fishes, the number of a goby (Rhinogobius flumineus), a loach (Niwaella delicata), chubs (Zacco platypus, Z. temmincki), a gudgeon (Pseudogobio esocinus) and a bullhead (Liobagrus reini) decreased, while a certain loach (Cobitis biwae) rather increased, but a gudgeon (Gnathopogon elongatus) and a dace (Tribolodon hakonensis) did not change in quantity during the years. The fish fauna and their populations were much different and remarkably lower compared with that of 10 yr before. The change may be caused not only by the change of environmental conditions in the river estuary affecting anadromous and amphidromous fishes but also by the effect of the pollution by the effluents of the pulp and paper mills.--Copyright 1973, Biological Abstracts, Inc.
W74-05580

STRIP MINING: PARTNERSHIP IN GREED,
H. M. Caudill.
American Forests, Vol 79, p 16-19, May 1973. 1 tab, 1 photo.

Descriptors: *Strip mines, *Coal mines, *Strip mine wastes, *Land reclamation, *Industrial production, Economic impact, Strip mine lakes, Coal mine wastes, Water pollution sources, Social aspects, Percolation, Topsoil, Soil leaching, Acidic water, Industrial wastes, Mine acids, Aesthetics.

The effect of strip mining on the landscape is described. Companies that shred a hill or plain do so to satisfy insistence on cheap power and abundant industrial products. Water collects in the empty holes and sulfur, iron, and other minerals leach out of the cliff polluting the water. On two adjacent valleys in Kentucky scientific studies indicated that in the mined valley thirty-thousand tons of dirt per square mile washed out compared to twenty-seven tons in the valley still under its natural woodland cover. Flood control reservoirs for which the Army Corps of Engineers expended eighty-three million dollars, were choked with mine silt. Stripping had reduced their life expectancy to ten or fifteen years. One reservoir became sterile within three years after stripping first yellowed its water. There is a need for stern laws and a land ethic which places the preservation of the earth and its waters above comfort, prestige, affluence, and liberty of the people. (Sperling-Florida)
W74-05582

DISEASES OF THE CULTIVATED PORPHYRA AT CULTURE BEDS WITH SPECIAL REFERENCE TO THE EFFECTS OF FERTILIZER PLANT EFFLUENTS (IN KOREAN),
Pusan Fisheries Coll. (Republic of Korea).
J. W. Kang.
Bull Kor Fish Soc, Vol 5, No 2, p 39-44, 1972, Illus, English summary.
Identifiers: Bays, Culture beds, Effluents, *Fertilizers, *Korea(Chinhae Bay), Photosynthesis, Pollution, *Porphyra diseases, Tides, Water pollution effects.

The Chinhae Bay (Korea) and adjacent waters were contaminated with fertilizer plant effluents. The photosynthetic activity of P. suborbiculata is lower by 4% in 200 ppm, 20% in 300 ppm and 43% in 1000 ppm of contaminated seawater containing diluted pollutants from the fertilizer plant. Photosynthesis was depressed about 21-34% near the fertilizer plant, and in the area of the Porphyra beds, 15% in the portion where tide is weak and 5% where the tide is strong, in comparison with the area of unpolluted water.--Copyright 1973, Biological Abstracts, Inc.
W74-05618

ENERGY PRODUCTION AND ENVIRONMENTAL CONSEQUENCES,
Office of Science and Technology, Washington, D.C.
R. Balzhiser.
In: Proceedings of Fourth National Sea Grant Conference, October 12-13, 1971, Madison, Wisconsin, 1225 West Dayton Street, Sea Grant Program, University of Wisconsin, Madison, p 61-71. 1 fig.

Descriptors: *Energy, *Environmental effects, *Power plants, Sites, Coals, Energy conversion, Legislation, Nuclear Reactors, Oil, Thermal pollution, Water resources, Technology, Nuclear power plants, Natural gas.
Identifiers: *Energy sources, Offshore plant sites, Skelly Wright/Calvert Cliffs decision.

The five major sources of energy in the United States, petroleum, natural gas, coal, hydro, and nuclear, are illustrated graphically. The only resource supplies which are available in sufficient abundance to meet future energy needs are coal and fissionable material, and given new technology, the sun and the sea. Legislation, pending before Congress regarding power plant siting, would require utilities to establish a ten year regional plan with information made available to state certifying agencies and the public ten years in advance of power plant construction. In July 1969, the Skelly Wright/Calvert Cliffs decision was made, requiring that each nuclear plant construction have an environmental impact statement which would consider thermal pollution and other environmental degradations, as well as operating hazards. This decision resulted in the writing of nearly one hundred environmental impact statements and could add two years to the time needed to get nuclear power plants into operation. New technological developments in energy production include: the liquid metal fast-breeder reactor, the offshore siting of large nuclear power stations, the improved efficiency of converting thermal to electrical energy, and the more efficient use of energy. (See also W74-05644) (Pinsky-Wisconsin)
W74-05645

SOME ECOLOGICAL EFFECTS OF DISCHARGED SUGAR MILL WASTES ON MARINE LIFE ALONG THE HAMAKUA COAST, HAWAII,
Hawaii Univ., Honolulu. Inst. of Marine Biology.
R. W. Grigg.
In: Hawaii Univ., Honolulu, Water Resources Research Center, Water Resources Seminar Series No. 2, December 1972, p 27-45. 7 fig, 7 tab, 9 ref.

Descriptors: *Marine biology, *Deposition(Sediments), *Food processing industry, *Hawaii, Pacific Ocean, Benthos, Coral, Marine fish, Reefs, Sugar cane, Sedimentation, Turbidity, Bioindicators, Industrial wastes.
Identifiers: *Hamakua coast(Hawaii), Sugar mill wastes, Bagasse.

A study was designed to evaluate the impact of sugarcane mill wastes on the marine environment off Hawaii's Hamakua coast since inorganic suspended solids settle out from the effluents accumulating on the bottom. Corals are very intolerant to sedimentation and may serve as sensitive indicators of particulate matter. Reef fishes also may be excellent indicators. No significant changes in temperature, salinity, or oxygen concentration were detected in the receiving waters off the sugar mills. Significant sediment deposits and bagasses exist in the immediate vicinity off the sugar mills at Pepeekeo, Hakalau, Ookala, and Honokaa. Intertidal organisms, coral, and other benthic invertebrates have been covered where sediments have accumulated. Recovery of coral and associated organisms in shallow water appears to begin soon after the mills cease discharging effluents. The pattern of distribution and abundance of Pocillopora meandrina, which is particularly sensitive to sedimentation, may be a good indicator of pollution by sugar mill wastes. Changes in both species and abundance of nearshore fishes have been observed off sugar mills where the catches were about one-third those off control stations. Fishermen agree that the major changes occurred shortly after mechanical harvesting of sugar cane began superseding the previous method of hand-harvesting. (See also W73-05857) (Jones-Wisconsin)
W74-05660

ORIGINS OF SUGAR MILL DISCHARGES ON THE HILO-HAMAKUA COAST AND A COURSE OF ACTION FOR THEIR CONTROL,
Brewer (C.) and Co. Ltd., Hawaii.
Q. D. Stephen-Hassard.
In: Hawaii Univ., Honolulu, Water Resources Research Center, Water Resources Seminar Series No. 2, December 1972, p 49-52. 6 fig.

Descriptors: *Sugarcane, *Effluents, *Hawaii, *Food processing industry, *Pollution abatement,

Coasts, Pacific Ocean, Soils, Harvesting, Fibers(Plant), Technology.
Identifiers: *Hilo-Hamakua coast(Hawaii), *Sugar mill wastes, Bagasse.

A largely aesthetic problem was created by sugar mill discharges along the Hilo-Hamakua coast off Hawaii due to the general practice of mechanical harvesting. Discoloration of the Pacific is caused by wash water effluents containing soil and fibrous waste products of cane cleaning and processing which the prevailing wet conditions and economic factors have precluded recycling for irrigation. While some mills will be closed others will handle the greater volume with firm pollution abatement plans to be implemented. One mill modification will include installation of a new boiler generator complex to consume all excess fibrous waste for generation and sale of electricity. Wastewater usage will be reduced by about 80% by dry cleaning cane with air blasts and using recycled mixed cane juice for final cleaning prior to milling. Improved harvesting techniques to reduce soil contact with cane are being developed. Although pollution abatement implementation is proceeding at best possible speed, the industry is considered in violation of the 1899 Refuse Act and court action is imminent. Ecological significance of the discharges is being evaluated against the costs of the injunction which could close all mill operations until clean-up is fully completed. (See also W73-05857) (Jones-Wisconsin)
W74-05661

THE INTERDEPENDANCE OF MARINE AND ESTUARINE ECOSYSTEMS IN SOUTH AFRICA,
Natal Univ., Durban (South Africa). Oceanographic Research Inst.
For primary bibliographic entry see Field 5B.
W74-05713

RESILIENCE AND STABILITY OF ECOLOGICAL SYSTEMS,
British Columbia Univ., Vancouver. Inst. of Animal Resource Ecology.
C. S. Holling.
Research Report (1972). 50 p, 4 fig, 45 ref.

Descriptors: *Ecology, *Ecosystems, *Balance of nature, Environmental effects, *Fish management, Productivity, Ecological distribution, Reviews, *Behavior.

This review explores both ecological theory and the behavior of natural systems to see if different perspectives of their behavior can yield different insights that are useful for both theory and practice. The resilience and stability viewpoints of the behavior of ecological systems can yield very different approaches to the management of resources. The stability view emphasizes the equilibrium, the maintenance of a predictable world, and the harvesting of nature's excess production with as little fluctuation as possible. The resilience view emphasizes domains of attraction and the need for persistence. But extinction is not purely a random event: it results from the interaction of random events with those deterministic forces that define the shape, size and characteristics of the domain of attraction. The very approach, therefore, that assures a stable maximum sustained yield of a renewable resource, might so change these conditions that the resilience is lost or is reduced so that a chance and rare event that previously could be absorbed can trigger a sudden dramatic change and loss of structural integrity of the system. A management approach based on resilience, on the other hand, would emphasize the need to keep options open, the need to view events in a regional rather than a local context, and the need to emphasize heterogeneity. The resilience framework does not require a precise capacity to predict the future but only a qualitative capacity to devise systems that can absorb and accommodate future events in whatever unexpected form they may take. (Knapp-USGS)
W74-05727

BIOLOGICAL ACTIVITY OF A CELL EXTRACT FROM THE DINOFLAGELLATE, AMPHIDINIUM CARTERI,
National Marine Fisheries Service, Milford, Conn. Milford Lab.
F. P. Thurberg, and J. J. Sasner, Jr.
Chesapeake Sci. Vol 14, No 1, p 48-51. 1973. Illus.
Identifiers: Amphibian hearts, *Amphidinium-Carteri, Atropine, Biological studies, *Cardio vascular drugs, Cell, *Crustaceans, *Dino-flagellate, Extracts, Fish, *Molluscans, Mytolon, Toxins.

Some physiological and pharmacological effects of cell extracts from A. carteri cultures are described. Mice and fish were killed by injection of extracts from lyophilized cells concentrated by centrifugation. Cellular extracts of A. carteri increased the development of tension in crustacean hearts while inhibiting molluscan and amphibian heart activity. The inhibitory effect was blocked by pretreatment of molluscan hearts with mytolon and amphibian hearts with atropine. Such physiological tests and recent chemical information indicate that a choline-like substance(s) is produced by A. carteri.--Copyright 1973, Biological Abstracts, Inc.
W74-05744

FISHES, MACROINVERTEBRATES, AND HYDROLOGICAL CONDITIONS OF UPLANDS CANALS IN TAMPA BAY, FLORIDA,
National Marine Fisheries Service, St. Petersburg Beach, Fla. Gulf Coast Fisheries Center.
W. N. Lindall, Jr., J. R. Hall, and C. H. Saloman.
U.S. Natl Mar Fish Serv Fish Bull. Vol 71, No 1, p 155-163. 1973, Illus.
Identifiers: Bays, *Canals(Upland), Estuary, *Fish, *Florida(Tampa Bay), Hydrological studies, *Invertebrates, *Dissolved oxygen, Water pollution effects.

Faced with statutory restraints that prohibit dredging and filling of estuarine bottoms, coastal developers have turned to alternate methods of providing water front property for homesites. One method, recently used in Tampa Bay, Florida, is the construction of access canals that lead from open water to upland acreage. Biological and hydrological data from new upland canals together with some comparative data from older upland canals and bayfill canals are presented. In all types of canals, as presently engineered, stratified, stagnant water causes low levels of dissolved O2 in summer months, resulting in mortality or emigration among resident organisms. Means of alleviating the problems are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-05916

PRIMARY PRODUCTIVITY IN A NUTRIENT-LIMITED TROPICAL ESTUARY,
Hawaii Inst. of Marine Biology, Honolulu.
G. Krasnick, and J. Caperon.
Pac Sci, Vol 27, No 2, p 189-196, 1973, Illus.
Identifiers: *American Samoa(Pala Lagoon), Discharges, *Estuary(Tropical), Growth, *Nitrogen, Nutrients, *Phytoplankton, *Primary productivity, Wastes.

The results of a survey of phytoplankton productivity, chlorophyll a, and nutrient concentrations in Pala Lagoon, American Samoa, are shown to be interpretable in terms of 2 regimes: an ocean-dominated region where productivity is controlled by fixed N concentrations, and a land-runoff-dominated regime where productivity is unrelated to major nutrient concentrations. A quantitative relationship between nutrient concentrations in the lagoon and phytoplankton growth rates is presented. This relationship is used as the basis for predicting the effects of a proposed dredging operation within the lagoon as well as for predicting the effects of increased waste discharge into the local marine environment.--Copyright 1973, Biological Abstracts, Inc.
W74-05939

MORPHOLOGICAL CHANGES IN THE LIVER OF FISH (LEBISTES RETICULATUS) DURING ADMINISTRATION OF DIETHYL AND DIMETHYLNITROSAMINES (IN RUSSIAN),
V. V. Khudolei.
Vopr Onkol, Vol 19, No 1, p 88-94, 1973, Illus, English summary.
Identifiers: Adenoma, *Cancer(Fish liver), Carcinogens, Carcinoma, Cellular, Cholangioma, Fish liver, *Lebistes-reticulatus, Morphological changes, *Nitrosamines, Guppies.

Aquarium guppies treated with diethyl and dimethylnitrosamines, showed diffuse and focal proliferation of the hepatic tissue, benign tumors (adenomas and cholangiomas) and malignant tumors (cholangiocarcinomas and hepatocellular cancer). The stage character of pretumor changes in carcinogenesis, the high sensitivity of fish to the hepatocarcinogenic action of nitrosamines and the rationality of using fish in experimental oncology are shown.--Copyright 1973, Biological Abstracts, Inc.
W74-05940

RESTRUCTURING OF RIVER BANKS AND SECONDARY POLLUTION: STUDY OF EUTROPHICATIONS IN PORT AREAS, (IN FRENCH),
Centre d'Études et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert, J. Aubert, J-M. Pincemin, N. Desirotte, and J-P. Breittmeyer.
Rev Int Oceanogr Med. 26, p 53-64. 1972. English summary.
Identifiers: Bacteriology, Chemistry, *Eutrophication, Plankton, *Port areas, *River banks, *Secondary pollution, Water pollution sources.

Harbor areas, withdrawn from hydrological exchanges with open sea, are the locality of accumulation of substances and wastes, leading, thereby, to some biological lack of balance of marine environment. The physics, chemistry, bacteriology and planktonology were studied. Results allowed, by statistical treatment, to point out a number of characteristic correlations of a more or less pronounced eutrophic state.--Copyright 1973, Biological Abstracts, Inc.
W74-05950

5D. Waste Treatment Processes

THE MICROBIOLOGY OF ACID MINE WATER TREATMENT IN PACKED BED COLUMNS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
R. F. Unz, and M. T. Lieberman.
Available from the National Technical Information Service as PB-229 649, $4.00 in paper copy, $1.45 in microfiche. Institute for Research on Land and Water Resources, Pennsylvania State University, Research Publication No. 77, December 1973. 73 p, 19 fig, 8 tab, 36 ref. OWRR A-024-PA(1). 14-31-0001-4038.

Descriptors: *Waste water treatment, *Ferrobacillus, *Thiobacillus ferrooxidans, *Acid mine water, *Iron bacteria, Iron compounds, *Trickling filters, Isolation, Disinfection, Membrane filters, Sulfur, Microbiology, Microorganisms, Oxidation, Microbial degradation.
Identifiers: Ferrobacillus ferrooxidans, Packed beds, Quaternary ammonium compound, Plate counts, Microtitre plate, Thiosulfates, Ferrous iron.

Percolation of acid mine water through columns of either argillite stone or 1.5 in. (3.8 cm) polypropylene trickling filter medium resulted in oxidation of constituent ferrous iron. From 87 to 96 per cent of the influent ferrous iron could be oxidized in passage of mine water through a two foot (61 cm) column of synthetic filter medium at a hydraulic loading of 1.3 gpd/sq. ft. (52.7 lpd/m2) effective surface area of medium. Ferrous iron oxidation was mediated by chemolithotrophic bacteria which were isolated and identified as Thiobacillus ferrooxidans. Iron encrusted filter medium solids were found to contain organic gelatinous matrices in which microorganisms were embedded. Several heterotrophic microorganisms were isolated from matrices and solids. Iron oxidizing bacteria but not heterotrophs were sensitive to a quaternary ammonium compound and the ferrous iron oxidation was curtailed in disinfected filter medium. Several morphologically distinguishable iron oxidizing bacteria were isolated from mine water on solid ferrous iron culture media although efforts to reliably enumerate the bacteria using spread plating and membrane filter culture procedures were unsuccessful. In this regard, it was necessary to use a microtitre plate-dilution dispersion technique to culture the bacteria present in natural samples from which most probable number (MPN) estimates of cell numbers could be made.
W74-05409

INVESTIGATION OF POROUS PAVEMENTS FOR URBAN RUNOFF CONTROL,
Franklin Inst. Research Labs., Philadelphia, Pa.
W. C. Grover, A. J. Hoiberg, T. I. Haigh, and E. Thelen.
Copy Available from GPO Sup Doc as EP1.16:11034 DUY 03/72, $1.25; microfiche from NTIS as PB-227 516, $1.45. Environmental Protection Agency, Water Pollution Control Research Series, March 1972. 142 p, 19 fig, 21 tab, 37 ref. EPA 11034 DUY. 14-12-924.

Descriptors: *Combined sewers, Treatment facilities, *Storm sewers, Water conservation, *Urban runoff, Waste disposal, *Asphalt concrete, Community development, Solid wastes, Overflow, Roads, Design, *Water pollution treatment.
Identifiers: *Porous Pavements.

Laboratory and economic studies were undertaken to determine the feasibility of utilizing porous pavements to alleviate combined sewer overflow pollution and reduce the design parameters of storm sewer systems by allowing storm runoff to percolate back into the ground. Laboratory studies of candidate materials revealed a porous asphaltic concrete containing 5.5% asphalt by weight and aggregate graded to allow a water flow of 76 in. per hour to be the optimal porous road material. Materials testing for stability, durability, and freeze-thaw susceptibility proved this material suitable for use in road construction. Asphalt Institute specifications were used to design roads with porous asphaltic concrete surfaces and gravel bases for varying traffic densities. Major design parameters considered were the load-bearing capacity and permeability of the subgrade, expected maximum precipitation and depth of frost penetration. Roads designed with porous asphaltic concrete were found to be generally more economical than conventional roads with storm sewers. The economics of porous pavement were further enhanced by the added value of benefits from combined sewer overflow pollution relief, augmentation of municipal water supplies, improved traffic safety, preservation of vegetation, relief of flash flooding and the aesthetic and directional benefits of a colored porous surface.
W74-05411

ASSESSMENT OF THE LOSS OF RADIOACTIVE ISOTOPES FROM WASTE SOLIDS TO THE ENVIRONMENT. PART 1: BACKGROUND AND THEORY,
Oak Ridge National Lab.

For primary bibliographic entry see Field 5B.
W74-05419

IN-PLANT MEASURES FOR REDUCTION OF THE SPECIFIC FRESHWATER CONSUMPTION OF PAPER MILLS,
Voith (J. M.) G.m.b.H., Heidenheim (West Germany).
J. Velinsky.
Translatiovailable from Inst. of Paper Chemistry, Appleton, Wis. 54911. Price: $5.00. Institute of Paper Chemistry, Appleton, Wisc, Translation, 9 p. Trans. from Das Papier, Vol 26, No 10A, Oct 1972.

Descriptors: Freshwater, *Water consumption, *Waste water treatment, *Water reuse, Water conservation, *Pulp and paper industry, *Industrial water, Water purification, Flotation, Filtration, Sedimentation, Settling basins, Recycling, Treatment facilities, Europe, Suspended solids, Retention, Spraying, Water circulation.
Identifiers: White water, Paper machines, Savealls, *Germany, Duo-Former(Paper machine), Showers(Paper machine), Wash water, Felts(Papermaking), Tissue papers, Printing papers, Newsprint.

A survey of 15 German paper machine installations indicated that the freshwater consumption per ton of paper produced varies greatly, depending on the kind of paper manufactured (newsprint, groundwood-containing vs. groundwood-free printing and writing papers, and tissue papers), as well as on the total daily production tonnage (relatively less water being used in high-production than in low-production units). For newsprint, 160 to 735 tons of water are needed daily; for fine papers, 100 to 370 tons; and for tissues, 58 to 120 tons. Few paper mills can recirculate machine white water without clarification, because fine fibrous debris and other suspended particles (such as fillers) can clog spray pipes, papermaking felts, and shower nozzles. Among various kinds of clarifiers, scraper and funnel savealls were found superior, in general, to disk filters, but their electric power demands are higher than those of flotation or sedimentation savealls. The latter's disadvantage is the longer retention time needed. Modern paper machines, such as the Duo-Former, are designed with simplified water circuits for conservation of freshwater. Some of these circuit diagrams are illustrated. (Brown-IPC)
W74-05433

INDUSTRIAL EXPERIENCE WITH PNEUMATIC-MECHANICAL AERATORS (OBYT PRIMENENIYA PNEVMOMEKHANICHESKIKH AERATOROV V PROIZVODSTVENNYKH USLOVIYAKH),
M. A. Evilevich, B. S. Prisker, T. G. Kulikova, I. N. Braginskii, and I. Sh. Levit.
Bumazhnaya Promyshlennost', No 6, p 6-7, June 1973. 2 tab.

Descriptors: *Aeration, *Aerated lagoons, *Pulp wastes, *Treatment facilities, *Waste water treatment, Turbines, Turbulence, Biochemical oxygen damand, Industrial wastes, Equipment, Oxygen, Oxygenation, Effluents, Pulp and paper industry, Oxidation, Foreign research, Electric power.
Identifiers: *USSR(Bratsk Pulp and Paper Mill), *Turbo-aerators.

A new Turbo-aerator with improved oxidizing power for treatment of pulp and paper mill effluents was developed at the All-Union Research Institute for the Pulp and Paper Industry. In essence it comprises two turbines mounted one above the other on a vertical shaft. Air is introduced below the bottom turbines via an annular perforated distributor which disperses air finely and intensifies turbulent oxygen exchange. The top turbine stirs the upper layers of the liquid waste, improves the exchange of oxygen between air and liquid, and eliminates foam. Pilot-plant installations evidenced an oxidizing capacity of 1500 g/cu m/day and a BOD reduction of 92-94% at a power consumption of 0.5-0.7 kw-hr/kg of 5-day BOD. Commercial installation of four larger turbo-aerators at the Bratsk Pulp and Paper Mill was found to double the efficiency of effluent aeration tanks compared to tanks using convential perforated-tube aerators. (Stapinski-IPC)
W74-05434

PROCEEDINGS OF THIRD SANITARY ENGINEERING CONFERENCE, DISINFECTION AND CHEMICAL OXIDATION IN WATER AND WASTE TREATMENT.
For primary bibliographic entry see Field 5F.
W74-05507

THE GERMICIDAL EFFICIENCY OF SILVER, IODINE AND QUATERNARY AMMONIUM COMPOUNDS,
Public Health Service, Cincinnati, Ohio. Div. of Water Supply and Pollution Control.
For primary bibliographic entry see Field 5F.
W74-05510

DISINFECTION AND OXIDATION OF DOMESTIC WASTES,
North Shore Sanitary District, Waukegan, Ill.
R. E. Anderson.
In: Third Sanitary Engineering Conference on Disinfection and Chemical Oxidation in Water and Waste Treatment, conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31-Feb 1, 1961, Urbana: Univ of Illinois Bulletin, Vol 59, No 46, p 48-52, January 1962. 4 tab.

Descriptors: *Chlorination, *Chlorine, *Reviews, Disinfection, *Waste water treatment, *Water treatment, Sanitary engineering.

Adequate chlorination of sewage effluents reduces coliforms to an acceptable level. A comprehensive program of sampling, laboratory tests, and analysis of data shows that chlorination of treated effluent is essential to the safeguarding of bathing water and public water supplies in the vicinity of the effluent outfalls. (See also W74-05507) (Knapp-USGS)
W74-05512

DISINFECTION AND OXIDATION OF INDUSTRIAL WASTES,
Industrial Waste Control, Flint, Mich. Buick Motor Div.
R. J. Brink.
In: Third Sanitary Engineering Conference on Disinfection and Chemical Oxidation in Water and Waste Treatment, conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31-Feb 1, 1961, Urbana: Univ of Illinois Bulletin, Vol 59, No 46, p 53-56, January 1962.

Descriptors: *Industrial wastes, *Disinfection, *Oxidation, Sanitary engineering, *Waste water treatment, *Waste treatment.

Sodium hypochlorite is used very extensively for the destruction of cyanide wastes. When using chlorine to destroy cyanide an alkaline material must be used in conjunction in order to control the pH. Ozone is cheaper than chlorine. The requirements of 03 to destroy cyanide are at least 2.5 lb per one pound of cyanide. (See also W74-05507) (Knapp-USGS)
W74-05513

AUXILIARY USES OF DISINFECTION OXIDIZING AGENTS IN WATER TREATMENT,
American Water Works Service Co., Inc., Philadelphia, Pa.
M. E. Flentje.

In: Third Sanitary Engineering Conference on Disinfection and Chemical Oxidation in Water and Waste Treatment, conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31-Feb 1, 1961, Urbana: Univ of Illinois Bulletin, Vol 59, No 46, p 57-61, January 1962. 1 fig, 6 tab, 7 ref.

Descriptors: *Oxidation, *Water treatment, *Chlorination, Sanitary engineering, Manganese.

Oxidation is an important water treatment procedure and is the reaction involved in disinfection. Oxidation is also employed in taste and odor control, in the removal of iron and manganese, sometimes to oxidize hydrogen sulfide, and as an aid to coagulation. The most economical source of an oxidizing agent is the oxygen of the air. Chlorine dioxide, an oxidizing agent with greater capacity than chlorine, has found a definite place in water treatment. Particularly good in combating phenolic tastes and odors, it is used in dosages of from two to five pounds of sodium chlorite per million gallons. The oxidation reaction of Mn is slow and in most filtration takes place almost wholly in the filter bed itself, where it is removed by a combination of oxidation and catalysis. The speed of reaction increases as the pH of a solution increases. Potassium permanganate is a fast-acting, powerful oxidizing agent that can be used in neutral or slightly alkaline pH ranges. This chemical, in some cases, could displace both some Cl and Cl02 in taste and odor control and for Mn removal. (See also W74-05507) (Knapp-USGS)
W74-05514

SURVEY OF WASTEWATER FACILITIES AND RECEIVING WATERS AND PROPOSED PERFORMANCE SPECIFICATIONS, MCGUIRE AFB AND FT DIX, NEW JERSEY, VOLUMES I AND II,
Environmental Health Lab., Kelly AFB, Tex.
J. W. Tremblay, and N. J. Lamb.
Available from NTIS, Springfield, Va. 22151 as AD-766 895, and AD-766 896, for $3.00 printed copy (each vol.); $1.45 in microfiche. Technical Report EHL(K) 73-12, July 1973. 362 p (Vol I-58p; Vol II-304p), 7 fig, 24 tab, 12 ref, 9 append.

Descriptors: *Military reservations, *Sewage treatment, *Water pollution control, *New Jersey, Water pollution sources, *Waste water treatment, Public health, *Treatment facilities.
Identifiers: McGuire AFB(NJ), Fort Dix(NJ).

A field wastewater survey was conducted at McGuire AFB and Ft Dix, New Jersey in September 1972. Extensive physical, chemical and biological sampling and analyses of the sewage treatment plants and the surface waters to which the plants discharge were accomplished. The quality of the receiving waters is degraded as a result of the sewage plant discharges. These two federal facilities should join in efforts to create a regional wastewater management system, and until then maintain the existing secondary sewage treatment facilities with minimum expenditure of capital investment funds. Performance specifications are proposed for the interim period, and recommendations for interim upgrading of the existing facilities are made. Alternative courses of action are evaluated in the event the regional management system does not materialize. (Knapp-USGS)
W74-05530

GROUNDWATER RECHARGE WITH TREATED WASTEWATER,
Wisconsin State Univ., Oshkosh. Dept. of Geology.
C. W. Fetter, Jr., and R. G. Holzmacher.
Journal of Water Pollution Control Federation, Vol 46, No 2, p 260-270, February 1974. 77 ref.

Descriptors: *Waste water disposal, *Water reuse, *Artificial recharge, Water spreading, Injection wells, Waste disposal wells, Reclaimed water, Clogging, Bacteria, Viruses.

Artificial recharge of aquifers is a proven method for conservation of groundwater resources. The use of open basins, stream channels, and spray irrigation is possible with a typical secondary effluent, but recharge through wells requires wastewater of higher quality. Very slight turbidity and bacterial growths may lead to rapid clogging of recharge wells. Recharge of a fine- or medium-grained aquifer does not seem to lead to problems caused by pathogenic bacteria or viruses if the water travels several hundred feet and the aquifer is not fissured. Water quality improvement may also be effected by physical and biological processes in the soil. (Knapp-USGS)
W74-05552

THE BEHAVIOR OF PARTICULATE MATERIAL IN THE TREATMENT LAGOONS OF A BLEACHED KRAFT PULP MILL,
Bedford Inst., Dartsmouth (Nova Scotia). Atlantic Oceanographic Lab.
J. M. Bewers, and G. J. Pearson.
Water Air Soil Pollut, Vol 1, No 4, p 347-358, 1972, Illus.
Identifiers: *Particulate matter, *Pulp wastes, *Treatment lagoons, Industrial wastes, Water pollution sources, *Waste water treatment.

The effect of treatment lagoons on the suspended particular matter contained in Bleached Kraft Mill Effluent was studied. Good settling characteristics for coarse material were found, but fine particles remained in suspension throughout the system. When the treated effluent was discharged into the brackish water of a narrow tidal cove, the increased ionic strength of the medium promoted the combination of fine particles. This flocculation effect produced a larger concentration of coarse material in the treated effluent than was contained in the raw mill discharge. A procedure for artificial flocculation, within the treatment system was suggested as a method of improving both the treatment efficiency and the physical properties of the effluent released to the marine environment.--Copyright 1973, Biological Abstracts, Inc.
W74-05615

COST EFFECTIVENESS OF REGIONAL WASTEWATER SYSTEMS,
Environmental Protection Agency, Washington, D. C. Systems Application Section.
W. N. Fitch.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 67-89. 12 fig, 2 tab.

Descriptors: *Waste water disposal, *Waste water treatment, *Costs, *Treatment facilities, Water quality standards, Water pollution, Municipal wastes, Septic tanks, Social aspects, Population, Future planning(Projected), Management, Environmental effects, Construction.
Identifiers: Module construction, Cost effectiveness, Soil absorption systems.

In order to improve the efficiency and effectiveness of wastewater systems, water quality management planning must precede facility construction. Goals must be set, and the effectiveness of the project must be determined from the perspective of costs, social effects, and environmental impact. More efficient means of constructing facilities would result if the uncertainties of future flow projections were reduced. The four primary factors which determine future waste treatment needs are population growth, extensions in domestic sewer coverage, new industrial connections, and a change in per capita waste generation. The uncertainty of population growth in a community is illustrated by census data for the decade 1960-1970. Module construction is the means suggested to deal with the uncertainty of waste treatment demand. This type of construction would provide the flexibility to respond to new technology or a change in the community growth pattern. A smaller community might find it more economical to improve its present soil absorption system rather than provide an expensive collection system. (See also W74-05629) (Pinsky-Wisconsin)
W74-05632

COST EFFECTIVENESS OF CURRENT ENVIRONMENTAL ENGINEERING PRACTICES,
Camp, Dresser McKee, Boston, Mass.
For primary bibliographic entry see Field 5G.
W74-05633

ECONOMIC GUIDELINES FOR ANALYSIS OF JOINT INDUSTRIAL-MUNICIPAL COLLECTION AND TREATMENT SYSTEMS,
Quirk, Lawler and Matusky Engineers, Tappan, N.Y.
T. P. Quirk, and J. E. Shirk.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 114-135. 3 fig, 7 ref.

Descriptors: *Waste treatment, *Industrial wastes, *Treatment facilities, *Economic feasibility, Municipal wastes, Costs, Economics, Taxes, Capital costs, Effluents, Operating costs, Pretreatment(Water), Methodology, Interceptor sewers.
Identifiers: Joint industrial-municipal waste treatment systems, Rate-making.

The economic factors which influence an industry's decision whether to construct independent treatment facilities or to participate in a joint industrial-municipal facility may be generalized from EPA sponsored studies of the design procedures and cost experiences in industrial and municipal waste treatment practices. One determining economic factor is the pretreatment costs for industrial effluents, with the requirement for pretreatment optimally based upon specific wastewater characteristics. Another factor to be considered is the tax relief provided industry by accelerated depreciation for the capital costs of industrial treatment facilities, which is equivalent to a construction grant of 17 percent. A third factor that must be considered is that traditional, municipal design practices include treatment facilities not normally included in an industrial facility, raising the capital cost of a joint treatment plant by from 20 to 25 percent over that of an industrial facility. A fourth consideration is the economies of scale and consolidation which is estimated on the average to entail a 20 percent reduction in unit construction and operating cost as wastewater flow doubles. Additional economic factors which must be considered are interceptor costs and the rate-structure philosophy. (See also W74-05629) (Pinsky-Wisconsin)
W74-05634

EFFECTIVE POLLUTION CONTROL INVESTMENT,
Environmental Protection Agency, Washington, D.C. Div. of Municipal Waste Water Programs.
R. C. Palange.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 149-157.

Descriptors: *Waste treatment, *Investment, *Water pollution control, *Municipal wastes, Treatment facilities, Federal Water Pollution Control Act, Federal Government, Sewers, Sewage treatment, Technology, Design, Construction, Population, Operation and maintenance, Government finance.
Identifiers: *Cost effectiveness, Municipal wastewater treatment.

The municipal wastewater treatment facilities construction program, which provides for the construction of waste treatment works, is directed toward three major goals: (1) to help bring water pollution from municipalities under control by achieving a rate of construction which will over-

come the unmet backlog of needed facilities; (2) to keep pace with needs for new facilities resulting from population growth; and (3) to match the need to replace facilities which become obsolete because of age, technical advancement, or population shifts. Some waste treatment facilities built under this program were not as successful as expected due to failure to utilize new technology and improved design practices, poorly trained operators, inadequate plant maintenance, and inefficient plant operation. The cost effectiveness of the program suffers from excess sewer connections and excess plant capacity. More efficient utilization of capital and an alternative investment procedure could result in more rapid progress in pollution abatement with higher cost effectiveness. (See also W74-05629) (Pinsky-Wisconsin)
W74-05635

THE PRESENT AND FUTURE MARKET FOR POLLUTION CONTROL EQUIPMENT,
Business and Defense Services Administration, Washington, D.C. Water Resources and Engineering Services Div.; and Bureau of Domestic Commerce, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05636

INDUSTRY VARIANCE OF CONSUMER PRICES AND COMPETITION AS A CONSEQUENCE OF WATER POLLUTION ABATEMENT,
Auburn Univ., Ala., School of Business.
H. B. Pickle, and A. C. Rucks.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 218-229. 1 fig, 4 tab.

Descriptors: *Water pollution control, *Competitive prices, *Textiles, *Steel, *Alabama, Effluents, Costs, Unemployment, Waste water treatment, Industrial wastes, Foreign trade, Economic impact.
Identifiers: Consumer prices.

Increased costs to industry associated with the installation of effluent treatment facilities could seriously disturb a firm's competitive position. The rise in per unit costs must be either absorbed by the producer, passed on to the consumer, or partially absorbed and partially passed on. The effect of water pollution abatement expenditures on competition in an industry depends on factors such as transportation costs, degree of labor costs, and unit price. A study of the textile industry in Alabama found that the costs of pollution abatement could not be passed on to the consumer. This is due to the small size of most textile producers, the relatively homogeneous products produced, and foreign competition. A firm that tried to raise prices to cover the costs of waste water treatment would lose between 24 and 36 percent of its market to other domestic firms, and between 14 and 17 percent to imports. In the steel industry, pollution abatement is more costly and difficult than in the textile industry. Profits are not sufficient to cover the costs of both cleaning up the environment and modernizing facilities. If the increased costs were passed on to consumers, imports would increase and domestic unemployment would rise. (See also W74-05629) (Pinsky-Wisconsin)
W74-05640

BENEFIT-RELATED EXPENDITURES FOR INDUSTRIAL WASTE TREATMENT,
Syracuse Univ., N.Y. Dept. of Civil Engineering.
N. L. Nemerow.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 230-246. 2 fig, 2 tab.

Descriptors: *Waste treatment, *Industrial wastes, *Cost-benefit ratio, *Economic justification, Water pollution, Marginal income, Marginal costs, Pulp and paper industry, Recreation, Income, Waste water disposal, Water utilization, Methodology, Costs, Benefits.
Identifiers: *Industrial waste treatment, Economic stability.

Industrial waste treatment and economic stability are both desirable goals which at times may be mutually exclusive. Waste treatment may cost more than an industrial plant can afford, forcing either pollution to be allowed or a loss of jobs and income. This raises the question of whether pollution abatement costs are justifiable. Dollar benefits of a clean water resource can be derived by evaluating recreation use benefits, withdrawal water use benefits, wastewater disposal benefits, land value benefits, and in-stream water use benefits. The total cost of maintaining that water quality level can be compared to the benefits derived. This enables the computation of a per unit charge for a pollution carrying capacity which can be applied to industrial wastes. Two industrial economics ratios have potential application in water pollution abatement. These include the relationship of waste treatment costs to production costs, and the cost of waste treatment for each 1000 gallons of waste treated. A feasible method of determining a firm's financial capability to provide waste treatment is illustrated. (See also W74-05629) (Pinsky-Wisconsin)
W74-05641

COSTS OF WATER POLLUTION CONTROL IN THE CHEMICAL INDUSTRY,
Datagraphics, Inc., Pittsburgh, Pa.
H. C. Bramer.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 247-254. 2 ref.

Descriptors: *Water pollution control, *Waste treatment, *Chemical industry, Industrial wastes, Treatment facilities, Capital costs, Operating costs.
Identifiers: Plant size, Joint industrial-municipal treatment plants, In-plant treatment.

The costs that would be incurred by the organic and inorganic chemical industries in attaining levels of water pollution abatement through 1973 are summarized. Production in the organic chemical industry was estimated at 120.7 billion pounds in 1969 and 156.0 billion pounds in 1973. The principal contaminates are BOD, COD, oil, suspended solids, acidity, heavy metals, color, taste and odor producing compounds and residual organic products and by-products. While joint industry-municipal waste treatment has proved effective, especially for smaller plants located near large municipal treatment systems, separate treatment has been shown to have economic advantages. Production in the inorganic chemical industry was estimated at 328.7 billion pounds in 1969 and projected at 455.5 billion pounds for 1974. Pollution control expenditures may affect this industry to a greater extent, because of a recent fall in the overall price index. Contaminates come primarily from electrolysis and crystallization brines, washings from filter cakes, spent acid and alkalies, and washings from raw materials. The inorganic chemical industry has also generally found that in-plant, separate waste treatment facilities have economic advantages, particularly when large quantities of waste water are involved. Data is presented for the operating and capital costs of various treatment levels. (See also W74-05629) (Pinsky-Wisconsin)
W74-05642

COSTS OF WATER POLLUTION CONTROL IN THE PAPER INDUSTRY,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
I. Gellman.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 255-270. 9 tab, 3 ref.

Descriptors: *Water pollution control, *Pulp and paper industry, *Cost-benefit analysis, *Economic impact, Water quality, Capital costs, Waste treatment, Waste water treatment.
Identifiers: Zero discharge.

The water pollution control costs of the paper industry have risen significantly between 1959 and 1972. During this time capital expenditures rose from $100 million to $816 million and annual charges rose from $14 million to $122 million, while the treatment costs rose from 0.75 to 6.4 cents per 1000 gallons. The A. D. Little estimate of treatment costs would result in a median price increase for paper products of $8.5 per ton or 5.5 percent. Also, the industries capital spending for pollution control could reach 40 percent of total capital outlays. A zero discharge treatment requirement could result in a 50 percent increase in product cost to the public. With these treatment costs rising, cost-benefit analyses must begin to take into account the benefits resulting from the institution of pollution control measures and allow for the physical quantification of improvements in water quality which result from pollution control expenditures, in order to be a realistic tool for management decision making. (See also W74-05629) (Pinsky-Wisconsin)
W74-05643

SOIL STORAGE LIMITATIONS ON EFFLUENT IRRIGATION,
Missouri Univ., Columbia. Dept. of Forestry.
C. D. Settergren.
Water Resources Bulletin, Vol 8, No 6, p 1273-1276, December, 1972. 2 fig, 9 ref.

Descriptors: *Sewage treatment, *Sewage disposal, *Waste water disposal, Pollution sources, Irrigation, *Water reuse, Recycling.

Over 23 billion gallons of sewage effluent are discharged in the United States each day. Increasingly strict water quality laws make effluent irrigation more inviting. At an application level of two inches per week, 129 acres are required to dispose of one million gallons of waste water per day. Dangers do exist and are delineated. With careful planning and reconnaissance, the disposal site can be selected to allow for more favorable disposal and renovation potential through irrigation. (Skogerboe-Colorado State)
W74-05676

REMOVAL OF MERCURY COMPOUNDS FROM WATER,
Phillips Petroleum Co., Bartlesville, Okla. (assignee).
R. P. Williams.
U.S. Patent No. 3,769,205, 3 p, 2 tab, 14 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1843, October 30, 1973.

Descriptors: *Patents, Industrial wastes, Mercury, *Sulfides, Chemical reactions, Pollution abatement, Water quality control, Water pollution control, *Heavy metals, *Separation techniques, *Waste water treatment.
Identifiers: Disulfides, Hydrocarbyl sulfide, *Mercury compounds.

By contacting an aqueous mixture contaminated by dissolved mercury compounds with a water insoluble organic sulfide or disulfide, preferably a hydrocarbyl sulfide or disulfide, all but minor amounts of the mercury contaminant can be removed from the water. The organic layer can be separated from the water layer. If desired, mixtures of one or more sulfides or disulfides or a mixture of a sulfide and disulfide may be employed as the extraction agent. (Sinha - OEIS)
W74-05684

METHOD OF TREATING WASTE WATER THROUGH ELECTROLYSIS,
Mitsui Mining and Smelting Co., Ltd., Tokyo (Japan). (assignee).
M. Ichiki, and M. Ishii.
U.S. Patent No. 3,769,186, 4 p, 2 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1839, October 30, 1973.

Descriptors: *Patents, *Waste water treatment, Industrial wastes, *Water purification, *Oil pollution, *Heavy metals, Suspended solids, *Electrolysis, Aluminum alloys, Pollution abatement, Water quality control, Water pollution control, Ions.

A method is described of treating waste water which is characterized by the purification of the industrial waste water containing at least one member of the group consisting of oil, emulsion, heavy-metal ion and suspended solid matter through electrolysis employing an aluminum alloy as the anode. Use of an aluminum alloy as the anode for electrolysis makes it possible to function continuously and for a long period of time by checking the rise in cell voltage. (Sinha - OEIS)
W74-05685

MICROBIAL DEGRADATION OF PETROLEUM,
Bioteknika International, Inc., Alexandria, Va. (assignee).
E. N. Azarowicz.
U.S. Patent No. 3,769,164, 7 p, 4 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1835, October 30, 1973.

Descriptors: *Microbial degradation, *Biological treatment, *Patents, Oil spills, *Oil pollution, Bacteria, Actinomycetes, Yeasts, Fungi, *Microorganisms, Pollution abatement, Water quality control, Water pollution control, *Waste water treatment.
Identifiers: Petroleum, Crude oils, Hydrocarbons.

Selected bacteria, actinomycetes, yeasts, and filamentous fungi break down crude petroleum, thus they can convert masses of spilled oil into masses of edible, nontoxic living cells. The microorganisms are special species that have been mutated to achieve the objectives of the invention. They have been deposited with the American Type Culture Collection in Rockville, Md. and are given ATCC catalogue numbers. (Sinha - OEIS)
W74-05686

SLUDGE TANK WITH SELF-CLEANING SCREEN AND SCREEN FOR USE THEREIN,
Clarkson Industries, Inc., New York. (assignee).
D. H. Hoag.
U. S. Patent No. 3,768,657, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1717, October 30, 1973.

Descriptors: *Patents, *Filters, *Sedimentation, *Waste water treatment, *Sludge treatment, Pollution abatement, Water quality control, Water pollution control, *Screens, *Settling basins.

The conveyorized sludge tank is the type in which relatively coarse objects are separated by sedimentation from a liquid medium in which they are suspended and then removed from the tank by the flights of a moving conveyor positioned partially within the tank. The tank is provided with a screen mounted at the bottom of the tank for swinging motion toward and away from the flights of the conveyor and adapted to lean against a course of the conveyor to cause the conveyor flights to continuously wipe the filtering surface of the screen. The screen is preferably formed in sections, each of which has spaced filtering strips and the filtering strips of adjacent sections diverge to form a herringbone pattern that minimizes and equalizes wear on the conveyor flights. (Sinha - OEIS)
W74-05687

IMPROVED PROCESS FOR TREATMENT OF AQUEOUS SUSPENSIONS,
K. A. Kraus.
Available from NTIS as PAT-APPL-148132(70); $3.00 paper copy, $1.45 microfiche. Atomic Energy Commission Patent Application Serial No. 148,132(70), May 28, 1971. 8 p, 2 tab.

Descriptors: *Patents, *Filtration, *Filters, *Waste water treatment, Separation techniques, Water quality control, Pollution abatement, Equipment, Water pollution control.
Identifiers: *Water clarification.

To maximize the benefits of cross-flow filtration, a method is provided for continuous removal of the surface cake or surface film which builds up on the filter during cross-flow filtration of a slurry at a minimal fluid velocity with or without a salt-rejecting membrane deposited on the filter. A method of treating aqueous waste streams for the purpose of removing a soluble or dispersed moiety comprises passing the stream through a vertically disposed, porous, permeable material which contains a zone of fluidization and a solid fluidizing medium in the zone at a velocity sufficient to affect transpiration of a purified water product through the material. Cake buildup can be effectively eliminated if cross-flow filtration is allowed to take place in a vertically disposed permeable filter hose in the presence of a fluidized bed of solid abrasive particles which have the capacity to remove the bulk of any deposited solid cake. (Sinha - OEIS)
W74-05690

RAW LIQUID WASTE TREATMENT SYSTEM AND PROCESS,
Jet Propulsion Lab., Pasadena, Calif.
M. F. Humphrey.
Available from NTIS as N73-31011, $3.25 paper copy, $1.45 microfiche. National Aeronautics and Space Administration Patent Application Serial No. 390,467, August 22, 1973. 21 p, 2 fig.

Descriptors: *Patents, *Waste water treatment, *Organic wastes, *Liquid wastes, Activated carbon, Pollution abatement, Water quality control, Water pollution control, *Sewage treatment, *Settling basins.

In the process, substantially all the non-dissolved matter in the raw sewage is first removed from the sewage water in a primary settler. The separation is facilitated by the addition of partially used activated carbon and ash material which was already used downstream. The sewage water from which the non-dissolved matter was removed is directed to a secondary settler. This water contains dissolved organic matter. The separated non-dissolved matter together with the used activated carbon and ash material from the primary settler are filtered to remove the water and are then supplied to a pyrolysis reactor where they are converted into fresh activated carbon and ash material. The latter, in the form of a primary slurry, is combined in a settler with the water in which organic matter is dissolved. The fresh activated carbon and ash material desorbs the dissolved organic matter and thereafter is returned upstream to the primary settler to facilitate the separation of the non-dissolved matter from the incoming raw sewage. The novelty resides in the formation of the activated carbon and ash material from the sewage contaminants without the addition of any reagents and, more particularly, in the use of this material first downstream to remove dissolved organic matter and only thereafter upstream to facilitate the removal of non-dissolved matter from the incoming raw sewage. (Sinha - OEIS)
W74-05692

SEWAGE: THE SURPRISING RESOURCE,
California Attorney General's Environmental Task Force, Sacramento.
W. Marx.
The Nation, Vol 216, p 588-591, May 7, 1973.

Descriptors: *Water reuse, *Sewage treatment, *Sewage disposal, *Reclamation(Waste water), *Reclaimed water, Irrigation practices, Domestic wastes, Industrial wastes, Tertiary treatment, Waste water treatment, Water resources management, Water allocation, Water resources, Water quality, Effluents.
Identifiers: *Sewage salvage.

Sewage salvage or water reclamation may outstrip weather modification, sea-water conversion, and other methods as the most feasible new water source. Changing aspects of both water management and sewage treatment make water reclamation more plausible. Sewage treatment is divided into primary, secondary, and tertiary levels. The main obstacle to water reclamation is more institutional than technical. Irrigation of crops and parks has become a common way to use reclaimed water particularly in arid areas. Industry is another potential user of reclaimed water. Some water management agencies belittle water reclamation and prefer to divert water from another region to satisfy their water gluttony. Water reclamation is stimulating institutional reforms--to adopt to an era of limited resources. Reclamation, however is no panacea for America's water problem. The National Industrial Pollution Control Council reported that water withdrawals would exceed the maximum supply shortly after 1980. (Sperling-Florida)
W74-05794

CONSTRUCTION OF WASTEWATER FACILITIES, LUFKIN, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Federal Highway Administration, Austin, Tex.
Available from National Technical Information Service, Springfield, Va. 22151, as PB-204 907-F, $3.00 paper copy, $1.45 microfiche. February 8, 1972. 188 p, 12 tab, 13 map, 1 illus, 1 chart.

Descriptors: *Environmental effects, *Waste water treatment, *Treatment facilities, Public health, Environmental sanitation, Sewage disposal, Waste water(Pollution), Sewage effluents, Interceptor sewers, Pumping plants, Sewage, Sludge treatment, Pipelines, Alternative planning, Alternative costs, *Texas.
Identifiers: *Environmental Impact Statements, *Lufkin(Tex).

This project consists of constructing sanitary sewer interceptors, pumping stations, force mains, waste treatment facilities, and appurtenances within and near the city of Lufkin, Texas. The proposed project is designed to provide wastewater facilities to meet anticipated demands of future development. It is intended to relieve the existing inadequate facilities, the effluents of which are currently polluting the receiving streams and creating health hazards. Alternative proposals which were considered include using two processing systems and the feasibility of combination of new facilities and utilization of existing facilities. Any adverse effects on the environment that will result from the construction and operation of the new facilities should be minimal when compared to the benefits received by the local population and to the ecological enhancement that will be realized. (Conko-Florida)
W74-05814

PAPER'S POLLUTION PROBLEMS,
For primary bibliographic entry see Field 5B.
W74-05817

MASTER PLANNING METHODOLOGY FOR URBAN DRAINAGE,
Rice (Leonard) Consulting Water Engineers, Denver, Colo.
For primary bibliographic entry see Field 6A.
W74-05834

A MATHEMATICAL MODEL FOR AEROBIC DIGESTION,
National Environmental Research Center, Cincinnati, Ohio.
R. Smith, R. G. Eilers, and E. D. Hall.
Available from NTIS Springfield, Va 22151 as PB-222 029 Price $3.75 printed copy; $1.45 microfiche. EPA National Environmental Research Center, Cincinnati, Ohio, Publication, July 1973. 45 p, 9 fig, 5 tab, 12 ref, append.

Descriptors: *Aerobic treatment, *Waste water treatment, Computer programs, Sewage treatment, Design, Costs, *Activated sludge, *Mathematical models, *Sludge treatment, Sludge disposal.
Identifiers: *Aerobic digestion.

Design and cost relationships for various modifications of the aerobic digestion process for disposal of waste organic sludges were studied in a mathematical model. The aerobic digester can be operated on a continuous basis with a settler or on a fill and draw basis, for reducing the volume of waste activated sludge only or for digesting a combination of primary and waste activated sludge. The concentrations of other constituents such as phosphorus and nitrogen in the effluent streams were calculated. (Knapp-USGS)
W74-05856

HANDBOOK FOR MONITORING INDUSTRIAL WASTEWATER.
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
For primary bibliographic entry see Field 5A.
W74-05862

A REVIEW OF WASTEWATER PROBLEMS AND WASTEWATER MANAGEMENT PLANNING IN THE SAN FRANCISCO BAY REGION, CALIFORNIA.,
Geological Survey, Menlo Park, Calif. Water Resources Div.
W. G. Hines.
Open-file report. January, 1973. 54 p, 8 fig, 16 tab, 3 append, 33 ref.

Descriptors: *Municipal wastes, *Waste water treatment, Waste water, *Waste treatment, *Waste water disposal, *California, Water pollution, Water pollution treatment, Water treatment, Waste disposal, Pollution, Long-term planning, Water quality, Toxicity, Pesticides, Water pollution effects, Reviews.
Identifiers: *Waste water management, *San Francisco Bay Area(Calif.), Regional planning, Municipalities.

Various agencies are engaged in comprehensive management planning for the San Francisco Bay Region. Initial objectives are consolidation and coordination of facilities and the elimination of wastewater discharges in ecologically sensitive areas. Quantities of wastewater discharged in the area are enormous and continually increase with population and economic growth and urban development. Total volume of pollutants contained in wastewater discharges, as measured by BOD (biochemical oxygen demand), biostimulant concentrations, and toxicity has increased despite large expenditures for new treatment facilities. Pollutants from other sources, such as agriculture and storm water runoff, have increased. Comprehensive programs propose industrial and municipal wastewater management for waste now discharged into the Bay with interim and long-range plans. Priority is placed on constructing wastewater-conveyance facilities to transport wastewater from areas where pollution is most acute. Local and sub-regional goals must be identified and evaluated to coincide with long-range state and federal wastewater management goals. Public awareness and participation is important for effectiveness of a management program due to interaction of social, economic, and environmental factors. (Grden-North Carolina)
W74-05863

WATER AND SEWER NEEDS OF LOW INCOME FAMILIES FOR THE MID-CUMBERLAND REGION OF TENNESSEE.
Mid-Cumberland Council of Government, Nashville, Tenn.
Available from the National Technical Information Service as PB-221 741; $4.25 in paper copy, $1.45 in microfiche. Final Report No. M-COG-1002-4. April, 1973. 36 p, 6 tab. CPA-TN-33-1002-308.3. CPA-TN-33-1002.

Descriptors: *Sewers, Water distribution(Applied), *Water costs, *Water demand, Water policy, Public utility districts, Cities, Planning, *Tennessee, *Plumbing.
Identifiers: *Low-income households, Mid-Cumberland Region(Tenn.), Public Service Commission, Federal incentive programs, Matching funds, Plumbing fixtures, Nashville(Tenn.).

Families living in the Mid-Cumberland Region with incomes under $4000 per year comprise 13.25% of the total number. Plumbing fixtures are absent from 10.2% of the households. A county-by-county breakdown of these percentages indicates a high correlation between the presence of low income families and households lacking in plumbing facilities. Several factors contribute to this situation. First, low income districts are not readily annexed into a city's or district's service area due to the low tax return expected or the area's inability to pay for services. Secondly, the Public Service Commission has no jurisdiction over utility districts, only municipalities. Consequently, the provision of water and services in utility districts is not responsive to the wishes of the public, but rather is a function of the market. A set of countywide water and wastewater commissions having jurisdiction only within their county would alleviate this problem, making the decision to provide services a political one and thus subject to the normal political processes. Thirdly, low income families are frequently unable to connect to nearby water and sewer lines due to high tap fees. The tremendous cost of installing plumbing fixtures is another deterent. The HUD water and wastewater facilities program provides an incentive for local matching money for areas with populations less than 10,000, within a SMSA, with unemployment twice the national average, and with poor or blighted conditions. Use of this program in low income areas would encourage the lowering of tap fees for qualified low-income families. (Hoffman-North Carolina)
W74-05870

SHAWNEE COMPREHENSIVE PLAN, WATER WORKS SYSTEM AND SANITARY SEWERAGE SYSTEM,
Benham-Blair and Affiliates, Inc., Oklahoma City.
E. M. Fry.
Available from the National Technical Information Service as PB-222 271; $4.25 in paper copy, $1.45 in microfiche. Memorandum No. 4, Final report. Prepared for Office of Community Affairs and Planning, Oklahoma City, Okla. January, 1973. 36 p, 7 fig, 5 tab, append. CPA-OK-06-56-1015.

Descriptors: *Comprehensive planning, *Waste water treatment, *Sewage treatment, *Water distribution(Applied), Water consumption, Water management(Applied), *Oklahoma, Water pollution, Sewerage, Long-term planning, Computer models.
Identifiers: *Shawnee(Okla), Oklahoma City(Okla).

The water and sewer portions of the Shawnee Comprehensive Plan are updated. Population will increase from 25,075 in 1970 to 32,480 or 33,980 by 1995, with most growth in the urbanizing area. Water consumption in 1972 was 100 gallons per capita per day, and 125 gallons are projected for 1995. Sanitary sewage flow is 88 gallons/day and is expected to increase slightly. Computer analysis is done for the water distribution system by simulating the pipe network; reduced pipe capacities due to encrustation appear. Essential features of the water and sewer system Master Plan for the 20-year period include a new raw water source by 1985, increased water treatment capacity, new trunk mains to improve water distribution, a minimum size of 12 inches for new mains, elevated storage, new treatment facilities north of the city, and new gravity sewers to eliminate the need for lift stations. A development program consists of five-year periods for planning initiation and orderly system expansion. (Grden-North Carolina)
W74-05871

SCAPE: A COMPUTER MODEL FOR ALTERNATIVE SEWER SYSTEM COST EVALUATION,
Southwestern Pennsylvania Regional Planning Commission, Pittsburgh.
J. P. DeAngelis, and R. A. LaMacchia.
Available from the National Technical Information Service as PB-224 717; $5.00 in paper copy, $1.45 in microfiche. December, 1972. 58 p, 9 fig, 5 tab. 93009335. Pa-P242.

Descriptors: *Computer models, Mathematical models, *Cost-benefit analysis, *Feasibility studies, Model studies, Cost allocation, *Costs comparison, Project planning, *Pennsylvania, Water policy, Waste water treatment, Waste disposal, Sewage, Sewage disposal, Sewerage, Sewage treatment, *Sewers, Water treatment.

SCAPE (Sewer Costs for Alternative Plan Evaluation), an analytic computer technique programmed in FORTRAN IV, estimates sewage system construction and operating costs to determine the least cost sewer system configuration. Given an area to be sewered, the number of people and workers to be served, a topographic map describing the area, analysts can devise alternative sewer service configurations and test them for least cost. A single expected cost and a cost range, based on the prediction interval of the cost estimating equations, is produced for each alternative. By comparing cost ranges of several alternatives, one determines if he has a statistically valid least cost solution or only an approximate one which arises when cost ranges of the lowest cost solutions overlap. This means a least cost solution cannot be statistically valid. The model also estimates sewage flow, pipe size, and slopes for alternatives. Alternatives may include gravity or forced flow, a system or combination of systems, and a variety of treatment facilities depending on the required effluent quality. It is possible to operate SCAPE in conjunction with a stream quality model to obtain best solutions from both a cost and pollution abatement standpoint. (Grden-North Carolina)
W74-05873

REGIONAL WATER AND SEWER CAPITAL IMPROVEMENTS PROGRAM.
Northwest Missouri Regional Planning Commission, Maryville.
Available from the National Technical Information Service as PB-223 792; $3.00 in paper copy, $1.45 in microfiche. Report No. NWMRPC-73-303. June, 1973. 10 p, 7 tab. Mo. P-200/SA-190.

Descriptors: *Management, *Sewage treatment, *Missouri, Costs, Sewage districts, Financing, Long-term planning, Sewage disposal, Waste treatment, Sewerage, Waste water treatment, Water quality, Waste water disposal, Waste disposal, *Regional analysis, *Sewers.
Identifiers: Regional planning, Capital investment, *Capital improvements.

The Northwest Missouri Regional Planning Commission, as part of its continuing planning and management program, maintains a Capital Improvement Program, with water and sewer im-

provements for the region described here. It updates the 1970 Comprehensive Plan for Water and Sewer Development. This report aids the Commission in judging timeliness of applications for federal assistance, lends support to individual improvement attempts, and notifies state and federal funding sources of the type, scope, cost, and timing of projects needing their assistance. Cities needing new sewage facilities and renovation of existing facilities, improvement of force mains, and improvements in collection systems by 1990 are specified, at a cost of $9,000,000. Six Rural Water Districts needed by 1975 are specified at a cost of $2,750,000, and 13 districts to be needed by 1990, are estimated to cost $5,595,000. Improvements can be financed through general revenue sharing funds, federal and state loans and grants, general obligation bonds, and revenue bonds. (Grden-North Carolina)
W74-05874

PRELIMINARY FEASIBILITY STUDY FOR THE POJOAQUE VALLEY SEWERAGE SYSTEM.
Northern Area Planning Organization, Sante Fe., N. Mex.
Available from the National Technical Information Service as PB-224 780; $4.50 in paper copy, $1.45 in microfiche. August, 1973. 70 p, 10 tab, 3 fig, 1 append. CPA-NM-1004-LP/D2.5.

Descriptors: *Sewage treatment, *Cost analysis, Cost-benefit analysis, *Feasibility studies, *Waste water treatment, *Indian reservations, Project planning, *New Mexico, Sewerage, Sewage disposal, Water quality, Long-term planning, Sanitary engineering.
Identifiers: *Pojoaque Valley(New Mexico), Waste water management, Santa Fe(New Mexico), Regional planning, Pueblo Indian grants.

Cost figures and preliminary design information for a comprehensive sewerage system to serve Pojoaque Valley, New Mexico area, approximately 16 miles north of Santa Fe, are presented. Total proposed project covers an area of about ten square miles, mostly in the alluvial plains of the Pojoaque River, Rio Tesuque and the Pojoaque Creek. Valley population is expected to double in two decades. Preliminary construction cost estimates range from $4,000,000 to $6,000,000. Operation and maintenance would cost $41,000 per year, and with grants from state and federal governments, cost per customer would range from $5 to $16 per month. However, without full participation of communities, cost per home would increase. Sinking funds are also needed to replace worn equipment and cover debt repayment. Financing through federal and state grants and general revenue sharing bonds can be used. Before proceeding further, other information is needed, including involvement of Pueblo Indian Tribal officials with easement rights, investigation of participation which can be expected in granting easements and paying for house connections, investigation of water quality to ascertain the degree and extent of surface and groundwater contamination from septic tanks, investigation of treated waste water reuse, definition of proposed sewer district boundaries and sewer ordinances, investigation of funding programs, establishment of a coordinating committee, and investigation of total value of assessed property in involved communities to determine possible bonding capacity of the sewer association. (Grden-North Carolina)
W74-05875

WATER SUPPLY AND WATER POLLUTION CONTROL CAPITAL PROGRAM, 1972-1985.
Delaware Valley Regional Planning Commission, Philadelphia, Pa.
(1972). 92 p, 35 tab, 14 fig.

Descriptors: *Comprehensive planning, *Delaware River, Management, Water sources, *Water pollution control, *Water supply, Water pollution, Pennsylvania, New Jersey, Water policy, Waste treatment, Environmental effects, Sewage treatment, Water treatment, Regional development, Long-term planning.
Identifiers: *Delaware River Valley Region, Philadelphia(Pa.), Capital programming, *Regional planning.

The Regional Water Supply and Water Pollution Capital Program, adopted by the Delaware Valley Metropolitan Region in 1972 to accompany the regional plan, will guide development in the region by relating priorities, environmental impact, and available finances. Uniform methodology for analysis and standardization of construction costs were used to determine scheduling allocations. Time adjustments between county master plans and the regional plan were made. As of 1972, 391 capital development projects were proposed for the nine-county region, an expenditure exceeding 1.2 billion dollars. Geographically, 148 projects are scheduled for New Jersey and 243 for Pennsylvania, at costs of 292 million and 930 million dollars, respectively. Twenty-three sewage treatment plants are proposed, with expansion of 46 others. Approximately 73% of pollution control expenditures in New Jersey and 92% in Pennsylvania are scheduled before 1978. In water supply expenditures, 1972-1977 accounts for 66% of New Jersey expenditures and 83% for Pennsylvania. Federal funding can now represent 75% of sewage facility costs, and a federal Environmental Financing Authority helps local and state governments raise money for their share of costs. With increased federal participation, proposed regional development looks promising. (Grden-North Carolina)
W74-05877

MANAGEMENT OF STORM DRAINAGE AND FLOOD CONTROL ACTIVITIES.
Denver Regional Council of Governments, Colo.
Available from the National Technical Information Service as PB-224 110; $4.00 in paper copy, $1.45 in microfiche. Project REUSE, Final Report (Supplement). August, 1972. 38 p, 2 tab, 6 fig. HUD COLO-USE-1. DHUD-H-1392.

Descriptors: *Storm drains, *Urban drainage, *Management, *Project planning, *Drainage systems, *Flood control, Groundwater, Comprehensive planning, *Colorado, Multiple-purpose projects, Water quality, Water pollution, Drainage water.
Identifiers: Project REUSE, Systems management, *Denver(Colorado), Systems approach.

Drainage and flood control management approaches are not consistent within the Denver, Colorado, region and are fragmented and crisis-oriented in scope. Responsibilities of drainage management require coordinated efforts of the elective, planning, and technical levels. The systems approach differentiates the technical, management, political, and economic aspects of complex systems. Governing officials establish goals and objectives, and planning management must develop alternative conceptual designs of drainage systems to meet objectives. Criteria for decision making, an important part of the systems approach, are supplemented by priorities based on available resources. Implementation of the plan requires an implementing agency which can also perform technical functions. Coordination among levels is essential to identify and resolve new issues and to discharge functional responsibilities. Drainage systems management includes describing the current system status and defining problems correctly. Considerations include defining physical elements, describing the functional processes, identifying limiting resources, and identifying undesirable functional interactions. Continuous informational interchange is needed, especially with multi-jurisdictional projects and to foreseee how decisions will impinge on other systems areas. (Grden-North Carolina)
W74-05878

PLANNING MANUAL FOR STORM DRAINAGE AND FLOOD CONTROL.
Denver Regional Council of Governments, Colo.
Available from the National Technical Information Service as PB-224 109; $8.25 in paper copy, $1.45 in microfiche. Project REUSE - Final Report (Supplement), August, 1972. 139 p, 23 tab, 26 fig, append. HUD COLO-USE-1. DHUD-H-1392.

Descriptors: *Systems analysis, *Management, *Flood control, *Storm drains, Floods, Storm runoff, Urban drainage, *Colorado, Water policy, River basins, River basin development, Runoff, Comprehensive planning, Drainage, Drainage systems, Drainage practices, Drainage water, Drainage basins, Drainage area, City planning, Pollution.
Identifiers: Project REUSE, *Denver(Colorado), Systems approach, Master planning, Major drainage.

Systems engineering methodology used for major drainage planning in Denver, Colorado, is presented. Systems to satisfy specific user needs by modifying an existing system or by designing a new one proceed through eight steps, including defining the problem, gathering data, describing the system, defining objectives, developing a model, describing alternatives, analyzing output, and implementing decisions. Major drainage, defined as presently unwanted flows of flood or storm runoff resulting from natural events and managed in the fluid state, has systems characteristics. The eight functions provide a base for analysis and development of short- and long-range programs of drainage systems. Methodology provides technology, procedures, and standards for designing master plans. Systems approaches are necessary for clear problem definition, an essential for finding maximum functional capability at minimum cost. Methodology is applied to the region by dividing it into ten planning basins, with subbasins used to determine applicable drainage action. Mathematical models to relate aspects of drainage analysis and design are included. (Grden-North Carolina)
W74-05879

LIQUID AERATION METHOD AND APPARATUS,
S. M. Candel.
U.S. Patent No. 3,768,788, 7 p, 8 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1749, October 30, 1973.

Descriptors: *Patents, *Sewage treatment, *Aeration, *Oxygenation, Equipment, *Liquid wastes, *Waste water treatment, Pollution abatement, Water quality control, Water pollution control.

Aeration of sewage is achieved by arranging several diffusing surfaces in an optimum pattern around the tank and transmitting an identical quantity of air through each diffusing surface so that several columns of air bubbles rise to the surface. This maximizes the rate of air/liquid interface production by increasing the mean velocity difference between air and liquid, and enhancing the degree of localized microturbulence. The residence time of the air bubbles is also increased and oxygenation is more efficient. (Sinha-OEIS)
W74-05883

DISPERSED GROWTH BIOLOGICAL SEWAGE TREATMENT PROCESS,
Oklahoma State Univ., Stillwater. (assignee)
D. F. Kincannon, A. Macuila, and W. G. Tiederman, Jr.
U.S. Patent No 3,769,204, 2 p, 1 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1843, October 30, 1973.

Descriptors: *Patents, *Sewage treatment, *Organic wastes, Metabolism, *Oxidation, *Biological treatment, *Waste water treatment.

Identifiers: Hydrocyclonic, *Secondary treatment.

A dispersed growth biological secondary sewage treatment process for removing dissolved organic material and suspended organic material from sewage conprises of the following steps: metabolize the dispersed biological solids to yield new cell material, carbon dioxide and water; subject the metabolized medium to hydrocyclonic forces to separate it into clean effluent and concentrated biological solids; and totally oxidize the concentrated biological solids in a saturation environment. The oxidation tank provides a starvation environment for the biological cells so that they will digest themselves. Air is injected into the tank and the new cell growth results in the production of water and carbon dioxide. The outflow is then injected by pump into the hydroclone concentrator. The outflow from the contrator is recycled until clear effluent is discharged as a nonpollutant. (Sinha - OEIS)
W74-05884

APPARATUS AND METHOD FOR REMOVING SOLIDS FROM LIQUIDS,
Rockwell International Corp., El Segundo, Calif. (assignee)
L. R. McCoy.
U.S. Patent No. 3,770,605, 6 p, 9 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 916, No 1, p 246, November 6, 1973.

Descriptors: *Patents, Electric fields, *Electrodes, *Waste water treatment, Equipment, *Pollution abatement, Solid wastes, Liquid wastes.
Identifiers: Hydrocyclonic, *Secondary treatment.

An apparatus and method are described for enhancing the effects of electrical fields in achieving the removal of finely divided solids from liquids. The apparatus includes an electrical cell structure consisting of at least two electrodes one of which is insulated, means to supply interrupted direct current or low frequency alternating current to the electrodes, and means to pass liquid contaminated with solid particles between the electrodes. A surface for collecting solids may also be interposed between the electrodes. (Sinha-OEIS)
W74-05885

WASTE TREATMENT APPARATUS,
Fairchild Industries, Inc., Germantown, Md. (assignee)
H. D. Freudenthal, R. E. Townsend, P. K. Zawoiski, and E. Schatz.
U.S. Patent No. 3,779,911, 12 p, 7 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 917, No 3, p 1087, December 18, 1973.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Equipment, *Microorganisms, *Aeration, Pollution abatement, Water quality control, Water pollution control, Hydrogen ion concentration.

A rotatable waste treatment drum is inclined in a stationary frame so that the waste sewage will flow from the inlet toward the outlet under the influence of gravity while being exposed to separate treatment stages in batches, separated within the drum by a helical member. The helical member is connected to the interior wall of the drum and to an axial hollow core and forms a plurality of variably spaced convolutions that are formed about the axial hollow core. As the drum rotates the batches of waste sewage disposed in the lower segment of the drum between the convolutions of the helical member are successively raised to a high level as the drum is rotated and the waste is undergoing treatment. Clarified liquid effluent is removed during the treatment cycle through the hollow core and part of the treated liquid effluent containing active microorganisms is introduced to the untreated waste entering the inlet end of the drum. Rotation of the drum and selective aeration of the waste sewage is controlled by a system associated with the drum. The control system has chemical sensing and dispensing apparatus that sense the chemical concentrations or pH of the wastes being treated and add chemicals to the wastes when needed. (Sinha-OEIS)
W74-05889

WATER CLARIFICATION PROCESS USING SILICON-CONTAINING AMINOMETHYL PHOSPHONATES,
Petrolite Corp., Wilmington, Del. (assignee)
D. Redmore, and F. T. Welge.
U.S. Patent No. 3,779,912, 10 p, 2 tab, 1 ref; Official Gazette of the United States Patent Office, Vol 917, No 3, p 1088, December 18, 1973.

Descriptors: *Patents, Water treatment, *Corrosion control, *Waste water treatment.
Identifiers: *Water clarification, *Chemical treatment, Phosphonates, Silicon, Alkyleneamino, *Scale inhibitors.

The silicon atom is silicone functional (i.e., has a -SiO-group) and is also attached to an alkyleneamino group which may have one or more amino groups (i.e., an alkylene-amin group having at least one N-H group) capable of reacting with a carbonyl compound (i.e., aldehyde or ketone) and phosphorous acid, or a derivative thereof, to form aminomethyl phosphonic acid. All, or less than all, of the N-H groups may be converted to aminomethyl phosphonic acids. The silicon-aminomethyl phosphonic acids may be monomeric, polymeric, or copolymeric. They are useful, for example, as corrosion inhibitors, scale inhibitors, water clarifiers and for other uses. (Sinha-OEIS)
W74-05890

WATER TREATMENT,
W. C. Martin.
U.S. Patent No. 3,779,913, 5 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 917, No 3, p 1088, December 18, 1973.

Descriptors: *Patents, *Waste water treatment, *Oxidation, Bubbles, Pollution abatement, Water pollution control, Water quality control, Equipment, *Aeration.
Identifiers: Compression, *Pressure vessels.

The method of treating water in a pressure vessel comprises the following steps: filling the vessel with a predetermined amount of air; adding a predetermined amount of water to the vessel, thereby compressing the air; recirculating the air from the top of the vessel and bubbling it through the water, thus inter-contacting the air and the water for a predetermined time, then venting the air, and draining the treated water. (Sinha-OEIS)
W74-05891

WATER RECLAMATION-ALGAE PRODUCTION,
Era, Inc., Clovis, N. Mex. (assignee)
J. E. Ort.
U.S. Patent No. 3,780,471, 7 p, 2 fig, 1 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 917, No 4, p 1224, December 25, 1973.

Descriptors: *Patents, *Waste water treatment, Pollution abatement, Suspended solids, Bacteria, Virus, Organic wastes, Phosphates, Nitrogen, *Algae, *Aerobic treatment, *Anaerobic conditions, *Reclamation, Water quality control, Water pollution control, Ponds.
Identifiers: Decarbonation.

Wastewater is treated in a manner which greatly reduces the level of organic waste matter, phosphates, fixed nitrogen, bacteria, virus and suspended solids. Water is reclaimed and an algae by-product is recovered by employing a series of three ponds with different depths and detention periods, each of which performs specific functions. A dissolved-air-lime flotation step is then used to separate suspended materials (primarily algae). After the flotation step the water is held at a high pH to achieve total disinfection prior to recarbonation to stabilize the water. The by-product algae material is refined by centrifugal separation of calcium carbonate from the slurry or, optionally, by alkaline hydrolysis of protein from the algae followed by acid precipitation to yield a high quality protein concentrate. One pond performs the anaerobic function, another the decarbonation function and an intermediate pond performs the aerobic function. (Sinha-OEIS)
W74-05892

WATER PURIFICATION APPARATUS AND CARTRIDGE THEREFOR,
H. N. Industries, Inc., New Haven, Conn. (assignee)
For primary bibliographic entry see Field 5F.
W74-05895

AEROBIC SEWAGE TREATMENT,
Bertran and Hargraves, Inc., Tampa, Fla. (assignee)
W. J. Hargraves.
U.S. Patent No. 3,780,997, 4 p, 10 fig, 14 ref; Official Gazette of the United States Patent Office, Vol 917, No 4, p 1362, December 25, 1973.

Descriptors: *Patents, *Aerobic treatment, Organic wastes, Pollution abatement, *Bubbles, *Liquid wastes, *Waste water treatment, *Sewage treatment, Equipment.
Identifiers: Biochemical digestion.

Contact between a gas stream and a mass of liquid sewage is achieved by use of several open ended inclined air-lift pipes immersed one above another in the liquid sewage. A stream of gas bubbles is introduced into the lowermost pipe whereby liquid is entrained therein. The upper end of each pipe, except the uppermost pipe, is disposed in a position below the lower end of the next higher pipe so that air bubbles issuing from the upper end of a lower pipe cause the liquid entrained therewith to be forced outwardly into the mass of liquid sewage. Gas bubbles subsequently enter the lower end of the next higher pipe and entrain new liquid sewage from the mass of liquid. (Sinha-OEIS)
W74-05896

WASTE TREATMENT SYSTEM,
Dayton Mfg. Co., Ohio. (assignee)
V. Materese.
U.S. Patent No. 3,782,550, 6 p, 13 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 918, No 1, p 279, January 1, 1974.

Descriptors: *Patents, *Waste water treatment, Slurries, *Filtration, Pollution abatement, Equipment, Water pollution control, Water quality control, Separation techniques.
Identifiers: *Chemical treatment.

The solids are separated from the liquids in a two stage operation. In one embodiment of the invention a series of settling chambers are utilized for the initial separation, while in a second embodiment screens having openings of decreasing size in the downstream direction are utilized. Both systems thereafter utilize a cylindrical filter to provide final separation of the solids from the liquids. The resulting liquid effluent passes from the filter into a mixing section of the treatment tank where it is mixed with an additive to render it pathogenically harmless and is thereafter discharged from the system when displaced by an incoming charge of sewage slurry. (Sinha-OEIS)
W74-05898

DECANTING CENTRIFUGE FOR DRAINING OFF WATER FROM SEWAGE SLUDGE,
Kruger (I.) A/S, Copenhagen (Denmark). (assignee)
J. Bye-Jorgensen, and G. H. Larsen.
U.S. Patent No. 3,782,623, 3 p, 2 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 918, No 1, p 298, January 1, 1974.

Descriptors: *Patents, *Sewage treatment, *Centrifugation, *Waste water treatment, *Sewage sludge, Pollution abatement, Water pollution control, Water quality control, Equipment.
Identifiers: Centrifuges.

The decanting centrifuge for draining off water from sewage sludge has a rotating bowl and helical walls rotating in it to scrape the sludge towards the end of the bowl to discard it. The rotating bowl has a small diameter in the region where the introduction takes place, to restrict the free drop of the sludge to a small distance, and at the same time providing a smooth passage, such as a conus, from the narrow part of the bowl to the wider part. This is important to secure a gradual increase of velocity and to reduce any tendency to create turbulence. (Sinha-OEIS)
W74-05899

PROCESS FOR RECOVERING FOREST PRODUCT PLANT WASTES,
R. E. S. Thompson.
U.S. Patent No. 3,783,128, 3 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 918, No 1, p 418, January 1, 1974.

Descriptors: *Patents, Bark, *Wood wastes, Sawdust, *Pulp wastes, *Activated carbon, Pollution abatement, *Filtration, *Waste water treatment, Pulp and paper industry.
Identifiers: Mill wastes, Forest products.

Solid cellulosic waste can be carbonized and, in a second stage, the charcoal produced can be formed into activated carbon. The activated carbon is then used as a filtration medium for liquid cellulosic waste which, when it becomes loaded, is recycled to the carbonizing step. The carbon and entrained solids are returned to one of the furnaces. Off-gas from all furnaces is passed to a boiler for steam generation; the spent gas is passed through an absorber, if necessary, before release. (Sinha-OEIS)
W74-05900

WASTE AND WATER TREATMENT SYSTEM,
Westinghouse Electric Corp., Pittsburgh, Pa. (Assignee).
A. B. Turner.
U.S. Patent No. 3,784,014, 5 p, 2 fig, 1 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 918, No 2, p 680, January 8, 1974.

Descriptors: *Patents, *Waste water treatment, Equipment, *Filtration, *Suspended solids, Activated carbon, Dissolved solids, *Electrophoresis, Separation techniques, Pollution abatement, Water pollution control, Water quality control.
Identifiers: Electrophoretic coalescene.

A minimum size, maximum effluent quality treatment apparatus is obtained by sizing the surge conditioning for minimim volume and the filtration system for maximum flow and performance. The filtration-absorption system includes at least one column of a bimetallic media. The particles of filter media having differing electrode potentials produce a galvanic cell and attract ionized particles in the throughput solution. Several columns may make up the filtration system. In one example, the media in the first column is 20 to 50 mesh aluminum powder. This filter medium performs a dual function. First it removes the conditioned suspended solids remaining in the liquid after the gross solids separation step performed by a coiled spring conveyor separator, and second it adds coagulating ions to the remaining liquid by corrosion of the aluminum powder. These aluminum ions precipitate and coagulate any suspended material and some of the dissolved material remaining in the liquid. After passing through this first column, the liquid goes to a stripper column. The stripper operation is based on the principle of electrophoretic coalescence. The stripper column may be filled with a mixture of aluminim powder and granular carbon which react to form a galvanic cell and attract the ions remaining in solution. The third column is filled with activated carbon. (Sinha-OEIS)
W74-05905

LIQUID TREATMENT PLANT AND PROCESS, PARTICULARLY FOR WASTE WATER,
Canadair Ltd., Montreal (Quebec).
J. E. Chatfield.
U.S. Patent No. 3,779,910, 4 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 917, No 3, p 1087, December 18, 1973.

Descriptors: *Patents, *Liquid wastes, *Waste water treatment, *Treatment facilities, Equipment, *Water purification, *Flocculation, Pollution abatement, Water quality control, Water pollution control.
Identifiers: Coagulants.

A process comprises serially flowing liquid containing impurities under gravity at predetermined relative velocities through several stages. A chemical coagulant is fed to the waste water influent and stirred to counter the normal flow to achieve extended residence time and reduce throughflow velocity of the waste water mixture through the mixing stage. The waste water mixture is then funneled to the bottom portion of the flocculation chamber. The mixture is raised through one field of suspended particles, recirculating deposited sludge into the flocculation chamber to enhance flocculation. Then by pumping deposited sludge into the flocculation chamber the sludge settles to produce supernatant. The sludge supernatant flows into the flocculation chamber and tumbles the waste water mixture, raises the mixture through another field of suspended particles, passes the mixture through curtains of falling floc and between sedimentation trays for deposition of the sludge and the formation of a clarified waste water mixture. The latter is chemically treated to obtain satisfactory flocculation and sludge deposition conditions in order to produce a purified waste water effluent which is allowed to overflow. (Sinha-OEIS)
W74-05906

METHOD AND APPARATUS FOR MIXING GASES WITH WATER,
Water Treatment Corp., City of Industry, Calif. (Assignee).
For primary bibliographic entry see Field 5F.
W74-05907

ATP POOLS IN ACTIVATED SLUDGE,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
S. Y. Chiu, I. C. Kao, L. E. Erickson, and L. T. Fan.
Journal Water Pollution Control Federation, Vol 45, No 8, p 1746-1758, August 1973. 18 fig, 4 tab, 30 ref. OWRR A-045-KAN(3) 14-31-0001-3516.

Descriptors: *Activated sludge, *Waste dilution, *Waste water treatment, Waste identification, Biological treatment, Sludge treatment.
Identifiers: *Process identification, *Adenosine triphosphate, Process control.

The possibility of using adenosine triphosphate (ATP) in process identification and control is investigated. Its suitability according to fixed criteria is discussed and other methods evaluated. Results of experiments indicate that dilution rate can affect sludge activity and cellular ATP content significantly and that ATP concentrations in experiments with both continuous and batch cultures were generally proportional to the biomass and to the amount of substrate removed. Because ATP concentration responds rapidly to cell viability and changes with population shifts and the phase of growth, it is concluded that ATP may be a useful variable in process identification, operation, and control, although further understanding of the relationship between ATP concentration and activated sludge behavior is necessary if its full potential as a measurable variable is to be realized.
W74-05914

OPTIMAL PLANNING FOR A THERMAL DISCHARGE TREATMENT SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
J. A. Dracup, and T. J. Fogarty.
Water Resources Research, Vol 10, No 1, p 67-71, February 1974. 2 tab, 7 ref.

Descriptors: *Water pollution control, *Thermal pollution, *Treatment facilities, Planning, River basins, Methodology, *Dynamic programming, *Simulation analysis, *By-pass piping, Temperature, Economics, Nuclear powerplants, Constraints, Equations, Reach(Streams), Systems analysis, Mathematical models, Optimal development plans.
Identifiers: *Cost minimization.

The characteristics and economic implications of thermal pollution are considered within the context of the planning of a treatment system for a series of hypothetical nuclear power plants that are to be located adjacent to a river. The problem is to determine the optimal planning of a treatment system. The objective of the planning procedure is to minimize the total annual cost for the construction and operation of the entire system, subject to a maximum temperature requirement within each reach or section of the river. The problem is solved by considering the effect that a bypass-piping system has on temperatures within the river. The technique of bypass piping consists of piping wastewater downstream to reaches of a river where the regenerative powers of the physical system have reduced the level of pollution to the extent that more waste water may be disposed. By noting that the bypass-piping system allows the beginning and end temperatures of a section of the river to be controlled, a procedure can be developed for separating the optimization model of the entire system. This model is separated into a set of small subproblems that are solved by simulation and a system problem that is solved by dynamic programming. Results show that the bypass-piping system significantly reduced the cost of the entire treatment system. (Bell-Cornell)
W74-05933

BIOLOGICAL TREATMENT OF WATER USED IN POTATO CHIP MANUFACTURE, WITH YEASTS, (IN FRENCH),
Laval Univ., Quebec. Departement des Vivres.
R. E. Simard, G. Busque, and R. R. Riel.
Can Inst Food Sci Technol J. Vol 6, No 1, p 32-36. 1973. Illus. English summary.
Identifiers: *Biological treatment, *Waste water treatment, Fodder, *Potato wastes, Rhodotorulaglutinis, *Yeasts, *Industrial wastes.

Potato chip waste water was submitted to biological treatment by yeasts and a strain of Rhodotorula glutinis gave the highest reduction efficiency in pollutants. The following reducations were obtained: 96.1% for phosphates, 85.2% for COD(chemical oxygen demand), 79.5% for ammoniacal N and 57.1% for total N in the waste water. The sludge contains 53.1% of protein and can be used as fodder.--Copyright 1973, Biological Abstracts, Inc.
W74-05944

5E. Ultimate Disposal Of Wastes

SURVEY OF WASTEWATER FACILITIES AND RECEIVING WATERS AND PROPOSED PERFORMANCE SPECIFICATIONS, MCGUIRE AFB AND FT DIX, NEW JERSEY, VOLUMES I AND II,
Environmental Health Lab., Kelly AFB, Tex.
For primary bibliographic entry see Field 5D.
W74-05530

GROUNDWATER RECHARGE WITH TREATED WASTEWATER,
Wisconsin State Univ., Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 5D.
W74-05552

SOIL STORAGE LIMITATIONS ON EFFLUENT IRRIGATION,
Missouri Univ., Columbia. Dept. of Forestry.
For primary bibliographic entry see Field 5D.
W74-05676

HIGHLIGHTS OF THE FEDERAL WATER POLLUTION CONTROL ACT OF 1972,
Morgan, Lewis and Bockius, Washington, D.C.
C. W. Smith.
Dickinson Law Review, Vol 77, No 3, p 459-491, Spring 1973. 121 ref.

Descriptors: *Legislation, *Water law, *Pollution control, *Permits, *Standards, Water quality, Water quality control, Waste discharge, Waste disposal, Industrial wastes, Pollutants, Pollution effects, Federal government, Administrative agencies, Jurisdiction, Effluents, State governments, Long-term planning, Navigable waters, Rivers, Lakes, Streams, Oceans, Water development.

The Federal Water Pollution Control Act of 1972 authorizes the Environmental Protection Agency (EPA) to deal with water pollution throughout the United States. The effect to industrial dischargers of effluents is described. The Act is two-pronged in that it imposes effluent limitations as well as water quality standards. The effluent discharge limitations on the discharge of pollutants will be enforced primarily by the issuance of a permit to discharge, contingent upon the situs state of the discharge certifying that the discharge complies with the Act. Federal jurisdiction extends to all navigable waters and emanates as well from the 'general welfare' clause in the Constitution. Discharge limitations focus upon the technology used at the source of the pollution to control and reduce it. Water quality standards deal generally with the results to be achieved. Industry is no longer provided with a license to pollute, but in fact must use all the technological developments at its disposal to develop sound pollution-free discharge systems by the target dates provided. The Act also extends to oil spills and ocean dumping as well as inland waterways. (Silber-Florida)
W74-05780

NORFOLK HARBOR DISPOSAL STUDY: HYDROGEOLOGIC STUDY OF NANSEMOND CITY DISPOSAL AREA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 5B.
W74-05847

5F. Water Treatment and Quality Alteration

WATER SUPPLY OF THE POPULATION AS A SOCIAL FACTOR IN THE PREVENTION OF INTESTINAL INFECTIONS, (IN RUSSIAN),
D. P. Nikitin.
Gigiena Sanitariya, Vol 37, No 10, p 54-56, 1972.
Identifiers: Human population, *Intestinal infections, *USSR, *Water supply, *Public health, *Disease prevention, *Conduits, Conveyance structures.

The 5-yr development plan of the Soviet economy provides for improving public welfare in populated centers, particularly the construction of water lines. These major social undertakings will help to eliminate the transmission of intestinal infections through water supplies.--Copyright 1973, Biological Abstracts, Inc.
W74-05456

PROCEEDINGS OF THIRD SANITARY ENGINEERING CONFERENCE, DISINFECTION AND CHEMICAL OXIDATION IN WATER AND WASTE TREATMENT.
Available from Univ of Illinois, Office of Publication, 49 Administration Bldg (West), Urbana, Ill Price $2.00. Conference conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31 and Feb 1, 1961, Urbana: University of Illinois Bulletin, Vol 59, No 46, January 1962. 62p.

Descriptors: *Water treatment, *Public health, *Disinfection, *Oxidation, Sanitary engineering, Water quality, *Waste water treatment.
Identifiers: *Iodination, Silver sterilization, Quaternary ammonium compounds.

Seven papers pertinent to disinfection and oxidation procedures in water supplies are presented. Titles are: Chlorine: Its Development; Characteristics and Utility for Disinfection and Oxidation; Feeding, Handling and Storage of Chlorine; The Germicidal Efficiency of Silver, Iodine, and Quaternary Ammonium Compounds; Analytical Procedures for the Control of Disinfectants in Water Treatment; Disinfection and Oxidation of Domestic Wastes; Disinfection and Oxidation of Industrial Wastes; and Auxiliary Uses of Disinfection and Oxidizing Agents in Water Treatment. (See also W74-05508 thru W74-05514) (Bean-AWWARF)
W74-05507

CHLORINE: ITS DEVELOPMENT, CHARACTERISTICS AND UTILITY FOR DISINFECTION AND OXIDATION,
Chlorine Inst., New York.
E. J. Laubusch.
In: Third Sanitary Engineering Conference on Disinfection and Chemical Oxidation in Water and Waste Treatment, conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31-Feb 1, 1961, Urbana: Univ of Illinois Bulletin, Vol 59, No 46, p 6-17, January 1962. 11 fig, 2 tab, 12 ref.

Descriptors: *Chlorination, *Chlorine, *Reviews, Disinfection, Waste water treatment, *Water treatment, Sanitary engineering.

The utility of chlorine in water treatment is attributable to its toxicological characteristics and its strong oxidation capacity. Chlorine is employed either to destroy or control bacteria, or to modify the chemical character of the water, or for both purposes. Not all chlorine forms are equally efficacious for all purposes. Although chlorine as a chemical oxidant has considerable utility in water treatment, by far its most important use is for disinfection, and for nuisance and other organism control. Combined chlorine forms, principally inorganic chloramines, are effective for disinfection providing the concentration and exposure time are adequate. (See also W74-05507) (Knapp-USGS)
W74-05508

FEEDING, HANDLING AND STORAGE OF CHLORINE,
Fischer and Porter Co., Maywood, Ill. Midwest Region.
R. D. Mann.
In: Third Sanitary Engineering Conference on Disinfection and Chemical Oxidation in Water and Waste Treatment, conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31-Feb 1, 1961, Urbana: Univ of Illinois Bulletin, Vol 59, No 46, p 18-28, January 1962. 8 fig.

Descriptors: *Chlorination, *Chlorine, *Reviews, Disinfection, Waste water treatment, *Water treatment, Sanitary engineering.

The proper facilities and operating procedures for storage, handling, and feeding of chlorine should never be thought of as being so commonplace that there is no need for either improvement or periodic training. Proper chlorination should begin with building facilities designed for maximum covenience compatible with maximum safety. Chlorine containers and the chlorine feeding equipment should be stored in rooms with no other equipment present. Although the cost of chlorination is a small percentage of the total plant cost, its contribution to the overall processing is extremely important from the public safety standpoint. Because of the virtual necessity of chlorination it is extremely important to: know the process both in its advantages and limitations; train personnel in safety procedures and proper maintenance of equipment; have the proper physical facilities for storing, handling, and feeding chlorine; and, finally, make a careful analysis of system requirements for special storage, handling, and feeding control to get maximum value for money spent. (See also W74-05507) (Knapp-USGS)
W74-05509

THE GERMICIDAL EFFICIENCY OF SILVER, IODINE AND QUATERNARY AMMONIUM COMPOUNDS,
Public Health Service, Cincinnati, Ohio. Div. of Water Supply and Pollution Control.
C. W. Chambers.
In: Third Sanitary Engineering Conference on Disinfection and Chemical Oxidation in Water and Waste Treatment, conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31-Feb 1, 1961, Urbana: Univ of Illinois Bulletin, Vol 59, No 46, p 29-42, January 1962. 3 fig, 6 tab, 34 ref.

Descriptors: *Disinfection, *Water treatment, *Waste water treatment, Bromine, Iodine, Silver, Ammonia, Sanitary engineering.

Silver, quaternary ammonium compounds, iodine, chlorine dioxide, bromine, and ultraviolet light are discussed as germicides for water treatment. The cost of using UV is difficult to relate to the price of chlorine, but the cost of current alone would be many times that of sufficient chlorine to do the same job. Chlorine dioxide is unstable, extremely corrosive, and a definite explosion hazard. Some of the advantages of using bromine are: it is easier to feed and not as hazardous to store as chlorine; the bactericidal efficiency of bromamines formed in swimming pools is much greater than that of chloramines; apparent freedom from complaints of eye irritation; and odors are not troublesome. Liquid bromine costs approximately 3.5 times as much as chlorine. Because of objectionable flavors and toxic effects quaternary ammonium compounds have not been seriously considered for use in drinking water. The Food and Drug Administration does not permit their use in milk and food products. They have been suggested for use to control algae in swimming pools. Another use for which they have been advocated is prevention of growths in cooling system water. The application of silver is limited to situations where cost is not a primary consideration. While some reduction in dosage with iodine might be considered because of probable increased persistence of the germicidal residual, the economics are strongly against the use of iodine as a substitute for chlorine except under circumstances where cost is a secondary consideration. (See also W74-05507) (Knapp-USGS)
W74-05510

ANALYTICAL PROCEDURES FOR THE CONTROL OF DISINFECTANTS IN WATER TREATMENT,
Georgia Inst. of Tech., Atlanta. School of Applied Biology.
R. S. Ingols.
In: Third Sanitary Engineering Conference on Disinfection and Chemical Oxidation in Water and Waste Treatment, conducted by Illinois Dept of Public Health and Univ of Illinois, Jan 31-Feb 1, 1961, Urbana: Univ of Illinois Bulletin, Vol 59, No 46, p 42-47, January 1962. 1 fig, 4 ref.

Descriptors: *Disinfection, *Chlorination, *Analytical techniques, Laboratory tests, Chlorine, Sanitary engineering, *Water treatment.

The quantity and quality of disinfectants used in water can be controlled by various analytical procedures. Simple test can be used readily by nonprofessional personnel for routine plant operation; complex procedures for more limited use by professionally trained people can provide information about the intensity of the possible disinfecting reactions as well as the quantity of the compounds present. These test are briefly reviewed. (See also W74-05507) (Knapp-USGS)
W74-05511

DISINFECTION AND OXIDATION OF DOMESTIC WASTES,
North Shore Sanitary District, Waukegan, Ill.
For primary bibliographic entry see Field 5D.
W74-05512

DISINFECTION AND OXIDATION OF INDUSTRIAL WASTES,
Industrial Waste Control, Flint, Mich. Buick Motor Div.
For primary bibliographic entry see Field 5D.
W74-05513

AUXILIARY USES OF DISINFECTION OXIDIZING AGENTS IN WATER TREATMENT,
American Water Works Service Co., Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-05514

HEALTH-MUNICIPAL WATER TREATMENT PLANTS.
For primary bibliographic entry see Field 6E.
W74-05773

WATER PURIFICATION APPARATUS AND CARTRIDGE THEREFOR,
H. N. Industries, Inc., New Haven, Conn. (assignee)
J. V. Zirlis.
U.S. Patent No. 3,780,867, 4 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 917, No 4, p 1327, December 25, 1973.

Descriptors: *Patents, *Activated charcoal, *Water purification, Diatomaceous earth, *Filtration, *Water treatment, Potable water, *Waste water treatment.

The water purification apparatus includes an elongated housing having a water inlet port and a water outlet port. A cartridge comprising an elongated casing is adapted for flow of water from the outside to the interior and then out one end for exit through the outlet port of the housing. The casing of the cartridge contains an activated charcoal medium as one water treatment stage. Surrounding the casing are two superposed sleeves comprising mesh of a gauge effective to retain coarse particulate matter in water flowing therethrough. A diatomaceous earth layer between the two stages defines another water treatment stage. (Sinha-OEIS)
W74-05895

OZONATING APPARATUS FOR DRINKING WATER,
Moody Aquamatic Systems, Inc., Meadville, Pa. (Assignee).
V. R. Troglione.
U.S. Patent No. 3, 784,008, 7p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 918, No 2, p 678, January 8, 1974.

Descriptors: *Patents, *Water purification, *Ozone, Bacteria, Pollutants, *Odor, *Taste, Water quality control, *Potable water, *Water treatment.

Drinking water is purified by automatically supplying ozone gas to remove undesirable bacteria, contaminants and/or undesirable odors or tastes from the water. With this apparatus ozone gas is automatically applied to contaminated water in a contact tank, and is then transferred to a discharge tank in such manner that contaminated water cannot accidentally pass from one to the other tank, when the system is on automatic operation. Electrical controls responsive to sensing means disposed exteriorly of the contact tank, and responsive to predetermined changes in the weight or level of the water in the contact tank, automatically replenish the supply of ozonated water in the discharge tank, when necessary. (Sinha-OEIS)
W74-05904

METHOD AND APPARATUS FOR MIXING GASES WITH WATER,
Water Treatment Corp., City of Industry, Calif. (Assignee).
S. W. Beitzel, and R. F. Edwards.
U.S. Patent No. 3,775,314, 4 p, 4 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 916, No 4, p 1493, November 27, 1973.

Descriptors: *Patents, *Oxygenation, *Ozone, *Water purification, Water quality control, Equipment, *Water treatment, Clathrates.

Water is purified by increasing the concentration and retention time of ozone and/or oxygen in water. The cyclonic mixing apparatus used consists of a hollow housing having an end wall; a cylindrical shaped wall attached to the end wall and defining a liquid receiving space. An inverted frustrum shaped wall is attached to the cylindrical wall opposite to the end wall. A liquid accelerating space is joined with a liquid receiving space. A whirling mass of fluid is injected into the body of water to be purified. In the body of water there is created a partial vacuum zone containing water and water vapor. Oxygen and/or ozone gas is introduced at a pressure of less than about 15 psi forming bubbles. As water vapor forms and cools water vapor condenses on the surface of the bubbles to form a clathrate molecule thus increasing the retention time of ozone and oxygen. (Sinha-OEIS)
W74-05907

5G. Water Quality Control

NITROGEN UPTAKE EFFICIENCY BY FOUR PLANT SPECIES IN THE FIELD AND GROWTH CHAMBER,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W74-05404

AN INVESTIGATION OF THE EFFECTS OF DDT AND OTHER CHLORINATED HYDROCARBONS ON THE GROWTH OF EURYHALINE MICROALGAE,
Maine Univ., Orono. Dept. of Botany; Maine Univ., Orono. Dept. of Oceanography; and Maine Univ., Orono. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-05407

INVESTIGATION OF POROUS PAVEMENTS FOR URBAN RUNOFF CONTROL,
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-05411

SUBSURFACE ASPHALT MOISTURE BARRIERS IN SANDY SOILS,
Delaware Univ., Newark. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W74-05412

MASS TRANSFER IN HETEROGENEOUS SYSTEMS AND VELOCITY AND GAS ABSORPTION STUDIES FOR SINGLE BUBBLES,
Iowa State Univ., Ames. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W74-05413

CYPRETTA KAWATAI, A NEW SPECIES OF FRESHWATER OSTRACODA (CRUSTACEA),
Geological Survey, Washington, D.C.
I. G. Sohn, and L. S. Kornicker.
Proc Biol Soc Wash. Vol 85, No 26, p 313-316, 1972. Illus.
Identifiers: Biomphalara-glabrata, *Crustacea, Cypretta-kawatai, New species, *Ostracoda(Freshwater), Predator, *Schistosomiasis, Vectors, Water pollution control, *Snails(Vectors).

Cypretta kawatai is described on the basis of several hundred specimens, in all stages of growth, from aquaria in the Johns Hopkins University, Baltimore, Maryland. The habitat is presumed to be freshwater ponds and ditches in Belo Horizonte, Brazil. This species is an effective predator of Biomphalaria glabrata, a vector snail of the blood fluke that causes schistosomiasis.--Copyright 1973, Biological Abstracts, Inc.
W74-05454

WATER SUPPLY OF THE POPULATION AS A SOCIAL FACTOR IN THE PREVENTION OF INTESTINAL INFECTIONS, (IN RUSSIAN),
For primary bibliographic entry see Field 5F.
W74-05456

WATER POLLUTION CONTROL IN ALASKA,
L. Laska.
Water Air Soil Pollut. Vol 1, No 4, p 415-432. 1972.
Identifiers: *Alaska, *Oil pollution, *Water pollution control, Legal aspects, *Water law, Jurisdiction.

An analysis of Alaskan water pollution laws and problems, especially oil pollution, is presented. Particular attention is given to statute law, jurisdiction, and procedures for applying the laws.--Copyright 1973, Biological Abstracts, Inc.
W74-05465

ADSORPTION OF HG(II) BY HYDROUS MANGANESE OXIDES,
University of Southern California, Los Angeles. Environmental Engineering Program.
For primary bibliographic entry see Field 5A.
W74-05491

FEEDING, HANDLING AND STORAGE OF CHLORINE,
Fischer and Porter Co., Maywood, Ill. Midwest Region.
For primary bibliographic entry see Field 5F.
W74-05509

CONSERVATION OF WATER AND REDUCTION OF POLLUTION BY USE OF SOLVENT

SYSTEMS FOR COLORING TEXTILE MATERIALS: AN ECONOMIC OUTLOOK,
Auburn Univ., Ala. Dept. of Textile Engineering.
For primary bibliographic entry see Field 3E.
W74-05535

OIL IN SCOTTISH WATERS,
Office of Naval Research, London (England).
For primary bibliographic entry see Field 5B.
W74-05551

PRIMER ON AGRICULTURAL POLLUTION,
For primary bibliographic entry see Field 5B.
W74-05569

PART 124--STATE PROGRAM ELEMENTS NECESSARY FOR PARTICIPATION IN THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
40 C.F.R. Part 124 (1973). 22 p.

Descriptors: *Federal government, *Permits, *Pollutants, *Discharge, *Water quality control, Administrative agencies, *State governments, Interstate compacts, Navigable waters, Standards, Regulations, Water quality, Water policy, Pollution control, Pollution abatement, Waste disposal, Effluents, Chemical wastes, Biological wastes, Radioactive wastes, Legal aspects, Water law, Planning, Cooperation.

Guidelines are established that specify procedural and other elements which must be present in a state or interstate program in order to obtain approval of the Administrator of the Environmental Protection Agency (EPA) for participation in the National Pollution Discharge Elimination System (NPDES). Any state or interstate program participating in the NPDES must have a statute or regulation, enforceable in State courts, which prohibits discharges of pollutants by any person, except as authorized pursuant to an NPDES permit. Any state or interstate agency participating in the NPDES shall insure that no permits shall be issued authorizing any of the following discharges: radiological, biological or chemical warfare agents or high-level radioactive wastes into navigable waters; or any discharge determined by the Secretary of the Army that would substantially impair anchorage and navigation. Additionally, each permit granted shall state the effluent standards and limitations as well as the water quality standards which must be observed by a discharger. (Silber-Florida)
W74-05573

PROTECTION OF PUBLIC WATER SUPPLY.
For primary bibliographic entry see Field 6E.
W74-05574

EXPLORATION, PRODUCTION, OR TRANSPORTATION OF OIL OR GAS IN NAVIGABLE WATERS.
For primary bibliographic entry see Field 6E.
W74-05576

SIERRA CLUB V. LYNN (ACTION CHALLENGING EIS WHICH FOUND COMMUNITY PROJECT WOULD NOT POLLUTE WATER RESERVOIR).
For primary bibliographic entry see Field 6E.
W74-05577

RESCUING THE OCEANS, THE NEED FOR IMMEDIATE ACTION,
For primary bibliographic entry see Field 5C.
W74-05579

STRIP MINING: PARTNERSHIP IN GREED,
For primary bibliographic entry see Field 5C.
W74-05582

NEPA IN THE COURTS: A LEGAL ANALYSIS OF THE NATIONAL ENVIRONMENTAL POLICY ACT,
Environmental Law Inst., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-05586

LEGISLATIVE FRAMEWORK FOR WATER RESOURCES MANAGEMENT IN ALABAMA.
Alabama Univ., University. Natural Resources Center.
For primary bibliographic entry see Field 6E.
W74-05590

WASTE DISPOSAL.
For primary bibliographic entry see Field 6E.
W74-05594

WATER POLLUTION--WASTE DISPOSAL.
For primary bibliographic entry see Field 6E.
W74-05595

WATER POLLUTION CONTROL POWERS.
For primary bibliographic entry see Field 6E.
W74-05596

HUMAN ECOLOGY AND COASTAL-ZONE POLLUTION,
Scripps Institution of Oceanography, La Jolla, Calif.
M. D. Bradley.
Water Air Soil Pollut. Vol 1, No 4, p 405-414, 1972.
Identifiers: *Coastal pollution, *Ecology, Land management, Water pollution, *Environmental resources.

The awareness of environmental problems has created a favorable climate for an intellectual orientation relevant to contemporary problems. Translating public opinion and legislation into long-range planning and rational policy for environmental resources is no simple task; an understanding of ecological principles, economic realities, and governmental jurisdictions and programs is needed. The present condition of inshore seas estuaries, and coastal-zones demonstrates how many immediately inadverse decisions prove damaging over the long run. The principles of general ecology, can provide helpful insights into managing the complex natural and human ecosystems of the coastal land-water interface. The concepts of carrying capacity, limiting factors, productivity, and homeostasis lead to a more complete understanding of pollution. Pollution can be defined as a residual, a left-over from production and consumption activities. Residual management becomes a matter of social choice, a process by which the underpriced assimilative capacity of the environment is treated as an input into social accounting and is priced accordingly. The ability of governments to provide effective management for environmental quality will depend upon the implementation of rationally determined development plans based on an understanding of residuals management. The natural resource ecosystems of coastal areas can provide man with increased benefits in the form of visual amenities, recreational benefits, and ecosystem homeostasis. Problems of management are critical and increasing.--Copyright 1973, Biological Abstracts, Inc.
W74-05597

POLLUTING STREAMS.
For primary bibliographic entry see Field 6E.
W74-05601

DEPARTMENT OF ENVIRONMENTAL CONSERVATION.
For primary bibliographic entry see Field 6E.
W74-05602

INTERSTATE MINING COMPACT.
For primary bibliographic entry see Field 6E.
W74-05604

PUBLIC WATER SUPPLY SYSTEMS.
For primary bibliographic entry see Field 6E.
W74-05606

WATER QUALITY AND EFFLUENT STANDARDS.
For primary bibliographic entry see Field 6E.
W74-05607

POLLUTING OR CONTAMINATING STATE WATERS.
For primary bibliographic entry see Field 6E.
W74-05608

POWER PLANT ENVIRONMENTAL RESEARCH PROGRAM.
For primary bibliographic entry see Field 6E.
W74-05609

SANITARY FACILITIES FUND.
For primary bibliographic entry see Field 6E.
W74-05612

POPULATION GROWTH, RESOURCE AVAILABILITY AND ENVIRONMENTAL QUALITY,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-05614

AN OPERATIONAL MATHEMATICAL PROGRAMMING MODEL FOR THE PLANNING OF ECONOMIC ACTIVITIES IN RELATION TO THE ENVIRONMENT,
Netherlands School of Economics, Rotterdam. Economic Research Inst.
For primary bibliographic entry see Field 6B.
W74-05616

ENVIRONMENTAL IMPACT AND WATER DEVELOPMENT,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 6G.
W74-05619

ANALYSIS OF ECONOMIC IMPACTS OF ENVIRONMENTAL STANDARDS ON THE BAKERY INDUSTRY, PART I, EXECUTIVE SUMMARY.
Ernst and Ernst, Washington, D. C.
Available from National Technical Information Service as PB-207 169 $3.00 in paper copy, $1.45 in microfiche. Council on Environmental Quality, Washington, D.C. December 1971. 4 p.

Descriptors: *Costs, *Industries, *Pollution abatement, Water pollution control, *Economic impact, Pricing.
Identifiers: *Baking industry.

A study of the impacts of pollution abatement requirements on the bakery industry has concluded that present abatement costs have been low, a practical result of the mild effluent flow and low volume of waste discharge; estimates range from .01 to .02 cents per pound in bread and related products to 5 to 9 cents per pound in the biscuit and cracker industry. To meet existing standards it is probable that bakery firms will choose higher sewage costs rather sewage costs rather than construct their own facilities using expensive urban-suburban land. An examination of the industry shows a multiplicity of plant anf firm sizes primarily located according to the population

density, no plant producing more than 4% of the industry's output. Little or no economic impact is foreseen in employment, dislocation, regional trends, international trade, prices and profits as a result of present abatement requirements. Future abatement cost increases hinge on potential tertiary treatment requirement, odor control requirements and increased electricity costs reflecting new environmental standards. The potential welfare implication of increased bakery prices arising from new standards may show that the cost of meeting such standards in the bakery industry falls disproportionately on the poor. (Schroeder-Wisconsin)
W74-05623

WATER MANAGEMENT AND THE ENVIRONMENT.
Organization for Economic Co-Operation and Development, Paris (France). Water Management Section Group.
For primary bibliographic entry see Field 6G.
W74-05625

APPLICATION OF MICROECONOMIC MODELS TO REGIONAL ENVIRONMENTAL QUALITY MANAGEMENT,
Resources for the Future, Inc., Washington, D. C.
For primary bibliographic entry see Field 6A.
W74-05627

THE EXTERNALITIES OF A TORREY CANYON SITUATION; AN IMPETUS FOR CHANGE IN LEGISLATION,
McCarty and Noone, Washington, D.C.
H. J. McGurren.
Natural Resources Journal, Vol 11, No 2, p 349-371, 1971. 7 fig, 26 ref.

Descriptors: *Oil pollution, *Costs, *Legislation, *Compensation, Oil spills, Insurance, Equity, Regulation, Penalties(Legal), Water pollution control.
Identifiers: *Liability, Externalities.

In developing legislation satisfactorily dealing with equity and efficiency arising from oil spills, the questions to be resolved are: who should bear the cost, what amounts should be expended to prevent or cleanup spills, and what mechanism should be used. Efficiency conditions require that the marginal benefit from preventing or cleaning up spills equal the additional cost. At present, shippers do not consider these costs in their production decisions, creating efficiency questions. The shippers' equity in not paying the cost of oil spills also arises. A historical review of existing statutes reveals a continued reliance on court imposed penalties as a mechanism to solve these efficiency and equity questions. The cost of discovering the benefits and costs of reducing or cleaning up oil spills has lead the courts to rely on single penalties, resulting in inefficient cost curves. As an alternative, the imposition of strict liability and compulsory insurance is suggested, and graphically shows to lead to an efficient outcome. The inclusion of compulsory insurance is a remedy to compensate for existing liability limitations of a shipper's assets. The 1970 Water Quality Act includes both of these elements. (Schroeder-Wisconsin)
W74-05628

THE PROCEEDINGS OF A NATIONAL SYMPOSIUM ON COSTS OF WATER POLLUTION CONTROL.
North Carolina Research Triangle Universities, Raleigh; and Environmental Protection Agency, Washington, D.C.
Available from North Carolina Water Resources Research Institute, Raleigh, N.C. 27607, for $8.00 prepaid. Symposium held on April 6-7, 1972, Raleigh, North Carolina, published by Water Resources Research Institute, North Carolina University. 276 p, 35 fig, 56 tab, 35 ref.

Descriptors: *Environment, *Economic impact, *Pollution abatement, Waste water treatment, Water pollution control, Effluents, Municipal wastes, Industrial wastes, Water pollution, Air pollution, Capital costs, Operating costs, Regulation, Costs, Benefits, Investment, Treatment facilities, Federal government, Cost-benefit analysis, Pollution taxes(Charges), Population, Planning, Water quality standards, Social aspects, Federal Water Pollution Control Act, Model studies.
Identifiers: Cost effectiveness, Joint industrial-municipal waste treatment systems, Pollution control equipment, Effluent charge, Economic incentives, Surcharge, Zero discharge.

This proceedings of a national conference 'Costs of Water Pollution Control' contains twenty-one papers. The central issue was whether pollution abatement should be accomplished by zero discharge ligislation or by some form of economic feasibility approach. In general, the zero discharge approach was considered impractical. Ultimately the degree of pollution abatement would be dependent upon the public's willingness to pay. Pollution problems are concentrated and equal levels of treatment may not be required in all areas of the country, population growth considerations and modular construction should be used more in the treatment facility planning process, pollution abatement cost evaluations h ve placed too little emphasis on benefits and too much on costs, and cost effectiveness should be a prime guideline in pollution abatement planning. The capability of the economy to pay cleanup charges was examined. The degrees of cleanup and associated costs are illustrated. Municipal and industrial waste disposal was considered in terms of treatment facilities, equipment, and capital and operating costs as well as the question of separate industrial treatment plants versus joint municipal-industrial plants. Also included were methodologies to assess cost effectiveness design and management practices, economic impact, economic feasibility, surcharges and economic incentives. (See W74-05630 thru W74-05643) (Pinsky-Wisconsin)
W74-05629

ECONOMIC IMPLICATIONS OF ALTERNATIVE NATIONAL POLICIES FOR WATER POLLUTION CONTROL,
Environmental Protection Agency, Washington, D.C. Planning and Evaluation Branch.
R. Luken, and M. Pisano.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 29-47. 1 fig, 9 tab.

Descriptors: *Water quality, *Waste water treatment, *Expenditures, *Economic impact, Water pollution, United States, Effluents, Environmental control, Capital, Marginal costs, Municipal wastes, Industrial wastes, Treatment facilities, Regulation, Standards.
Identifiers: Clean Water Program.

The Environmental Protection Agency uses a three dimension index of pollution, called the PDI index, which considers the prevalence, duration and intensity of pollution. Using this index it was found that pollution problems are concentrated rather than universal and that equal levels of treatment may not be required in all areas of the country. Also, the PDI data supports controlling non-traditional pollution points sources. The marginal cost of pollution treatment rises rapidly as higher levels of treatment are achieved. The total cost of municipal waste treatment facility construction is estimated at $18.1 billion by EPA through fiscal 1976, while an estimate derived from an evaluation of data from the Municipal Waste Inventory for 1971 is $14.3 billion. The cost of pollution control investment for the industrial sector is estimated to range between $8.1 and $12.2 billion. All costs for attainment of effluent standards for the industrial sector amount to a cash outlay of $20 billion for the period 1968-1976. Since EPA is interested in meeting its stated objectives at the lowest possible costs, cost effectiveness and the efficient use of resources are stressed. A possible cost minimizing alternative is a national effluent charge. (See also W74-05629) (Pinsky-Wisconsin)
W74-05630

ECONOMIC IMPLICATIONS OF ALTERNATIVE NATIONAL GOALS,
National Wildlife Federation, Washington, D. C.
T. L. Kimball.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 48-56.

Descriptors: *Economics, *Environment, *Pollution abatement, *Costs, Water pollution, Capital, Federal government, Air pollution, Cost-benefit analysis, Surveys, Social participation.
Identifiers: *Opinion polls, Goals.

There are two choices in terms of alternative national goals, zero pollution, or that amount of pollution control which is economically feasible. There is neither the capital nor the public support for the former, so the real question is: What is economically feasible. This will not be decided by economists, but by how much the average citizen will pay to clean up the environment. The public is concerned about the environment, with a 1969 Harris Public Opinoin Poll indicating that four out of five Americans are either concerned or deeply concerned about the environment. The National Wildlife Federation determined that a reasonable clean up program would require an investment of $10.2 billion annually (or $170 per family) for five years, while the pollution damage would eventually be reduced by $22.2 billion annually. Approximately half of those interviewed in a survey favored paying the $170 per family to clean up pollution now and save money in costs eventually. Another consideration of alternatives, the Club of Rome study, indicates that the policy makers and scientific community should study whether exponential growth is the only means to achieving progress and maintaining economic stability. (See also W74-05629) (Pinsky-Wisconsin)
W74-05631

COST EFFECTIVENESS OF REGIONAL WASTEWATER SYSTEMS,
Environmental Protection Agency, Washington, D. C. Systems Application Section.
For primary bibliographic entry see Field 5D.
W74-05632

COST EFFECTIVENESS OF CURRENT ENVIRONMENTAL ENGINEERING PRACTICES,
Camp, Dresser McKee, Boston, Mass.
R. C. Marini.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 90-100.

Descriptors: *Environmental engineering, *Treatment facilities, *Costs, *Economic feasibility, Pilot plants, Mathematical models, Computer models, Waste water treatment, Surveys, Construction, Management, Pollution abatement, Federal Water Pollution Control Act.
Identifiers: *Cost effectiveness, Clean Water Program, Construction management.

Social benefits commensurate with the Clean Water Program are only possible if cost effective design and management practices are followed. Optimal solutions to environmental engineering problems are developed by the following steps: (1) Listing feasible, effective solutions; (2) Preliminary assessment of relative economies and impractical solutions; (3) Verification of feasibility if remaining solutions are not in common use; (4) Economic comparison of remaining alternatives on the basis of generalized costs; (5) If selection is

not clear-cut, vigorous functional and cost comparison of few remaining alternatives; (6) Avoidance of unnecessarily high factors of safety and of unnecessary embellishments during final design; and (7) Selection of optimum capacity-design periods for facilities based on representative discounting rates, economy-of-scale parameters and patterns of expected demand increase. Pilot plants, computers and mathematical models, industrial waste surveys, and construction management are useful tools in this approach. While the elimination of all pollutants in the waterways by 1985 is theoretically possible, its implementation, as proposed in the Federal Water Pollution Control Act, would require expenditures of more than $316 billion. The 95 to 99 percent pollutant removal level would cost only $118 billion indicating that the cost effectiveness of the program should be evaluated. (See also W74-05629) (Pinsky-Wisconsin)
W74-05633

ECONOMIC GUIDELINES FOR ANALYSIS OF JOINT INDUSTRIAL-MUNICIPAL COLLECTION AND TREATMENT SYSTEMS,
Quirk, Lawler and Matusky Engineers, Tappan, N.Y.
For primary bibliographic entry see Field 5D.
W74-05634

EFFECTIVE POLLUTION CONTROL INVESTMENT,
Environmental Protection Agency, Washington, D.C. Div. of Municipal Waste Water Programs.
For primary bibliographic entry see Field 5D.
W74-05635

THE PRESENT AND FUTURE MARKET FOR POLLUTION CONTROL EQUIPMENT,
Business and Defense Services Administration, Washington, D.C. Water Resources and Engineering Services Div.; and Bureau of Domestic Commerce, Washington, D.C.
K. L. Kollar, and R. Brewer.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 158-167.

Descriptors: *Equipment, *Water pollution control, *Investment, *Economic prediction, Construction, Waste water treatment, Costs, Environmental control, Treatment facilities, Marketing.
Identifiers: Pollution control equipment.

The Council of Environmental Quality and the EPA estimate the direct costs of cleaning up the environment to be $105 billion between 1970 and 1975, with water pollution control costs increasing from $3.1 to $5.8 billion annually. These figures, while large, are not beyond the capability of the national economy. Most of the money to be spent for pollution control is for construction rather than equipment. Of total wastewater expenditures, only 5.4 percent consists of pollution control equipment, with that figure rising to about 12 percent for water supply treatment plants. An evaluation of the backlog, obsolescence, depreciation, future growth, and feasible market indicates that a $30.0 billion municipal construction program may be expected to be completed by 1980. Using the same information, the industrial market would be $11.8 billion for this same time period. This results in a total water pollution control market between 1971-1980 of $41.8 billion for construction and $5.7 billion for equipment. (See also W74-05629) (Pinsky-Wisconsin)
W74-05636

POLLUTION CONTROL POLICY AND THE EFFICIENT ALLOCATION OF RESOURCES,
Council of Economic Advisors, Washington, D.C.
A. K. McAdams.
In: Proceedings of a Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 172-187. 2 fig, 3 tab.

Descriptors: *Cost-benefit analysis, *Pollution abatement, *Economic impact, Cost-benefit ratio, Water pollution, Air pollution, Effluents, Marginal costs, Gross National Product, Inflation, United States, Pollution taxes(Charges), Market value, Costs, Benefits.

Pollution control costs are looked at in order to determine if the United States can afford pollution control. It would cost $60 billion between 1972 and 1982 to remove 87 percent of the pollutants from water, while removing the next 10 percent would cost $60 billion more, and the final 3 percent an additional $200 billion. These figures suggest marginal costs which rise exponentially. A study indicates that with the pollution control costs currently mandated, the rate of growth in real GNP would decline by $6 billion annually versus the base line average, and this minor amount could be offset by appropriate monetary and fiscal policies. Inflation is shown to be unaffected by pollution control expenditures, though it would rise 0.26 percent annually if fiscal or monetary offsets were instituted. Thus, the U.S. can afford pollution control. In order to meet the pollution control question in practice, the private decision maker should be guided to take actions which benefit himself and automatically benefit society. This can be done by setting a fee for the creation of pollutants which would be equal to benefits derived by the removal of those pollutants. This would internalize pollution costs and more efficiently allocate resources. (See also W74-05629) (Pinsky-Wisconsin)
W74-05637

ECONOMIC INCENTIVES IN WATER POLLUTION CONTROL,
Bowdoin Coll., Brunswick, Maine. Dept. of Economics.
A. M. Freeman.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 188-200.

Descriptors: *Economic efficiency, *Effluents, *Water pollution control, *Pollution taxes(Charges), Air pollution, Federal government, State governments, Cities, Marginal costs, Environment, Costs, Regulation, Law enforcement, Pollution abatement.
Identifiers: *Effluent charge, *Economic incentives, Subsidies, Waste discharge.

A shift in government pollution control policy toward a program based on economic incentives and away from one based on regulation, enforcement and subsidy is advocated. The present policy has two elements. It provides federal subsidies to cities for the construction of waste treatment plants, and it regulates effluent discharges and enforces these regulations through the courts. The subsidy aspect has been unsuccessful due to lack of planning, the absence of necessary incentives to cities, and the perverse incentives to firms which lead to wasted resources. The regulation/enforcement aspcet has also been unsuccessful, for it is basically a lengthy bargaining process between polluters with great interest and regulators representing a diffused public. The recommended policy would put a price on environmental resources. With a charge made for the discharge of wastes, polluters would have an incentive to reduce discharges to the environment. Polluters would determine their level of discharge based on the marginal cost of eliminating the effluent versus the charge. The residual charge should be set at a level which limits discharge to that consistent with acceptable levels of air and water quality. An effluent charge policy would be both more efficient and more effective than the present regulation-enforcement policy. (See also W74-05629) (Pinsky-Wisconsin)
W74-05638

WATER AND WASTEWATER SURCHARGES AS ECONOMIC INCENTIVES,
North Carolina State Univ., Raleigh. Dept. of Economics.
J. A. Seagraves.
In: Proceedings of a National Symposium on Costs of Water Pollution Control, April 6-7, 1972, Raleigh, North Carolina, p 201-209. 2 fig, 1 tab, 3 ref.

Descriptors: *Waste treatment, *Water pollution control, *Pollution taxes(Charges), Effluents, Sewers, Institutions, Industrial wastes, Cities, Elasticity of demand, Permits, Costs, Benefits, Textiles, Pulp and paper industry, Chemical industry, Food processing industry.
Identifiers: *Economic incentives, *Surcharge, Transferable permits.

Many cities have added a surcharge, based on the strength of industrial wastes, to water and sewer bills. Using data from four high-polluting industries, food processing, textiles, chemical and pulp and paper, an equation (T=86-14.6 S) was derived relating industrial wastes per $1000 of value added in manufacturing (T) to the amount of the surcharge (S). It was also found that a one percent increase in the surcharge is associated with an 0.8 percent decline in wastes and a 0.6 percent decline in water usage. A one percent increase in the price of water is associated with a 1.0 percent decrease in industrial wastes and a 0.7 percent decrease in industrial water usage. The surcharge is typically set at the city's estimated cost of treating wastes. This method is shown to result in a net benefit to society. An alternative method based on transferable effluent permits would allocate a property right, yet it would still force industry to recognize the opportunity value of reducing wastes. This method would reduce wastes, but it would not restrict a municipality's ability to attract or maintain industry, as a surcharge might. (See also W74-05629) (Pinsky-Wisconsin)
W74-05639

INDUSTRY VARIANCE OF CONSUMER PRICES AND COMPETITION AS A CONSEQUENCE OF WATER POLLUTION ABATEMENT,
Auburn Univ., Ala., School of Business.
For primary bibliographic entry see Field 5D.
W74-05640

BENEFIT-RELATED EXPENDITURES FOR INDUSTRIAL WASTE TREATMENT,
S, acuse Univ., N.Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-05641

COSTS OF WATER POLLUTION CONTROL IN THE CHEMICAL INDUSTRY,
Datagraphics, Inc., Pittsburgh, Pa.
For primary bibliographic entry see Field 5D.
W74-05642

COSTS OF WATER POLLUTION CONTROL IN THE PAPER INDUSTRY,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-05643

ECONOMIC GROWTH VS. ENVIRONMENTAL PROTECTION: WHAT WILL BE THE OUTCOME,
Wisconsin Univ., Madison. Dept. of Economics; and Wisconsin Univ., Madison. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6C.
W74-05644

SOME REMARKS ON AQUACULTURE,
Hawaii Univ., Honolulu.

For primary bibliographic entry see Field 6C.
W74-05647

MOVEMENT OF NITRATES UNDER IRRIGATED AGRICULTURE,
Nebraska Univ., Lincoln. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 5B.
W74-05666

OIL ACCUMULATOR,
Massachusetts Inst. of Tech., Cambridge. (assignee).
J. B. Nugent.
U.S. Patent No. 3,768,656, 3 p, 3 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1717, October 30, 1973.

Descriptors: *Patents, Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Separation techniques.
Identifiers: *Accumulators(Oil).

The oil accumulator comprises a floatable box which is open at the top and bottom. The stern is closed and the bow is open. Appropriately located with the box is a ramp designed so that when a wave with oil on its surface enters the box, it is caused to surge up the ramp and spill over it. The oil is trapped within the box but the water is free to exit through the open bottom. Accumulators are inserted at appropriate intervals in the boom systems which, in turn, are arranged to channel the oil into the accumulators. (Sinha - OEIS)
W74-05688

APPARATUS FOR REMOVING OIL AND OTHER FLOATING CONTAMINANTS FROM A MOVING BODY OF WATER,
J. W. Strohecker.
Available from NTIS as PAT-APPL-203267, $3.00 paper copy, $1.45 microfiche. Atomic Energy Commission Patent Application Serial No. 203,267(70), November 1971. 12 p, 4 fig.

Descriptors: *Patents, *Skimming, *Oil pollution, Oil spills, *Pollution abatement, Water quality control, *Flotsam, *Separation techniques.

This skimming system uses the natural gravitational flow of water. It consists of a diversion boom positioned diagonally across a stream and in registry with the surface of the latter for intercepting and diverting floating contaminants into a weir. The weir is located in the stream bank upstream from but adjacent to the downstream end of the boom. The weir is ballasted so that the contaminants are directed through or over the weir. The contaminants then are conveyed through a conduit and discharged into a retention basin which contains an under flow weir. The boom is designed to adapt to changing water level. (Sinha - OEIS)
W74-05691

WATER POLLUTION,
Robert S. Kerr Water Research Center, Ada, Okla.
For primary bibliographic entry see Field 5B.
W74-05740

EROSION CONTROL,
Soil Conservation Service, Stillwater, Okla.
For primary bibliographic entry see Field 2J.
W74-05741

SEWAGE WORKS OF MUNICIPAL CORPORATIONS AND SANITARY DISTRICTS,
For primary bibliographic entry see Field 6E.
W74-05745

PUBLIC SERVICE DISTRICTS FOR WATER AND SEWERAGE SERVICES.
For primary bibliographic entry see Field 6E.
W74-05746

NATURAL AREAS PRESERVATION.
For primary bibliographic entry see Field 6E.
W74-05748

UNLAWFUL SEWAGE DISPOSAL.
For primary bibliographic entry see Field 6E.
W74-05749

WILL SUCCESS SPOIL NEPA,
For primary bibliographic entry see Field 6E.
W74-05750

MUNICIPAL WATER POLLUTION CONTROL--STANDARDS OF QUALITY AND PURITY.
For primary bibliographic entry see Field 6E.
W74-05752

WATER POLLUTION CONTROL--ENFORCEMENT.
For primary bibliographic entry see Field 6E.
W74-05753

WATER RESOURCES MANAGEMENT.
For primary bibliographic entry see Field 6E.
W74-05756

POLLUTION CONTROL AGENCY.
For primary bibliographic entry see Field 6E.
W74-05757

WATER POLLUTION--CLASSIFICATION OF WATER SUPPLY AND WASTE WATER TREATMENT FACILITIES.
For primary bibliographic entry see Field 6E.
W74-05758

ENVIRONMENTAL LAW--RIVERS AND HARBORS APPROPRIATIONS ACT--PRIVATE PERSONS MAY NOT SUE IN QUI TAM WITHOUT EXPLICIT GRANT OF PERMISSION FOR CITIZEN SUITS.
For primary bibliographic entry see Field 6E.
W74-05763

WASTE DISCHARGE PERMITS: NO DEFENSE TO WATER POLLUTION ACTIONS,
Lewis and Clark Coll., Portland, Oreg. Northwestern School of Law.
A. E. Staines.
Environmental Law, p 181-188, Winter 1971. 37 ref.

Descriptors: *Legal aspects, *Water pollution, *Water pollution control, *Water policy, *Public rights, Permits, Legislation, *Oregon, Water, Water pollution sources, Abatement, Pollution abatement, Non-structural alternatives, Water quality, Water quality control, Water quality standards, Water resources.
Identifiers: Injunctive relief, Nuisance(Legal aspects).

Under Oregon law, public interest in maintaining pollution-free waters prohibits a waste discharge permit from being employed as a defense in a state abatement pro specifications. A new section of this statute provides that any permit to build aceeding or prosecution for water pollution. Such a permit is equally ineffective as a defense in a private injunctive suit or damage action for water pollution. Since permits can confer no greater rights than the law itself grants, and since the law prohibits water pollution, discharge permits cannot authorize such pollution. Accordingly, issuance of such a permit does not sanction any nuisance which results from polluting acts. Oregon law provides that the state has title to the land below a navigable river's high water line. The state also owns all water sources. Since water pollution is prohibited, to allow such pollution is to permit an illegal private use of public property. Since an administrative agency possesses only those powers expressed in its enabling act, a waste discharge permit allowing water pollution is void as beyond the agency's powers over public property. (Ritchie-Florida)
W74-05764

COUNTY OF FREEBORN V. BRYSON (DECLARATORY JUDGMENT ACTION CONCERNING PORTIONS OF A NATURAL WILDLIFE MARSH).
For primary bibliographic entry see Field 6E.
W74-05765

A BILL AMENDING THE PUBLIC HEALTH SERVICE ACT AND THE FEDERAL FOOD, DRUG, AND COSMETIC ACT IN ORDER TO ASSURE SAFE DRINKING WATER.
For primary bibliographic entry see Field 6E.
W74-05767

WATER POLLUTION--PENALTY PROCEEDINGS.
For primary bibliographic entry see Field 6E.
W74-05772

REGULATIONS CONCERNING WASTE DISCHARGE REQUIREMENTS, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
California State Water Resources Control Board, Sacramento.
May 1973. 42 p.

Descriptors: *California, *Waste discharge, *Permits, *Water quality control, *Administrative agencies, Water quality, Water control, Water policy, Standards, Regulations, Federal government, State governments, Pollutants, Environmental sanitation, Waste disposal, Pollution sources, Industrial wastes, Agricultural wastes, Cities, Treatment facilities, Water law, Legal aspects, Water resources development, Conservation, Ecological impact, Legislation.

The Waste Discharge Requirements of the National Pollution Discharge Elimination System (NPDES) for California, as authorized by the California Administrative Code are described. The regulation of water is carried out by the State Water Resources Control Board, and nine regional Water Quality Control Boards. Waste discharge requirements (permits) are adopted for each individual discharger, to protect water quality. Each contains limits on the quality of the effluents and specifies conditions to be maintained in the receiving waters. Monitoring is required, especially where concentrations of substances critical to downstream beneficial uses can be expected to vary greatly. No waste discharge requirements will be issued if: the discharge contains a radiological, biological or chemical warfare agent; or high level radioactive waste; such would substantially impair anchorage or navigation; or the federal administrator objects in writing. Permits are required for municipal treatment plants, agricultural facilities and industrial discharges. California standards must be within the bounds of those outlined by the administrator of the Environmental Protection Agency and subject to their regulation. (Silber-Florida)
W74-05777

AMERICAN WATERWAYS: FLORIDA OIL POLLUTION LEGISLATION MAKES IT OVER FIRST HURDLE,
Oregon Univ., Eugene. School of Law.

P. N. Swan.
Journal of Maritime Law and Commerce, Vol 5, No 1, p 77-110, October 1973. 199 ref.

Descriptors: *Florida, *Legislation, *Pollution control, *Legal aspects, *Water law, Water quality, Water quality control, Water resources, Water policy, Judicial decisions, Shores, Beaches, Oily water, Pollutants, Polllution effects, Standards, Regulation, State governments, Vessels, Ports, Harbors, Facilities, Structures, Navigable waters, Oceans, Sea water, Federal government, Licenses, Permits, Standards, Navigation, Pollution effects, Pollution abatement.

The 1970 Florida Oil Spill Prevention and Pollution Control Act deals with measures to reduce the likelihood of accidental spills as well as with civil obligations to compensate those harmed by the escaped oil or other pollutants. The Act applies to terminal facilities in Florida's ports and to ships destined to or leaving such facilities. The United States Supreme Court in Askew v. American Waterways Operators upheld Florida's right under the police power to impose liability in damages for losses suffered by both the state and by private interests. Attacked on the basis that it would be unduly burdensome to interstate commerce, the Court found ample enabling power in the Tenth Amendment and various other decisions holding that states are often in the best position to protect the health and welfare of their own citizens. The Florida statute is designed to serve five basic purposes: to confer licensing authority; to regulate the deliverance and transference of hazardous materials; to establish a compensation-and-control-expense fund; to make terminal operators and carriers strictly liable for pollution damage; and to make them responsible for removing escaped pollutants. (Silber-Florida)
W74-05778

NO FAULT LIABILITY FOR OIL POLLUTION DAMAGE,
S. Bergman.
Journal of Maritime Law and Commerce, Vol 5, No 1, p 1-50, October 1973. 194 ref.

Descriptors: *Pollution control, *Pollution abatement, *Water law, *Water policy, *Legislation, Water quality, Water quality control, Water resources development, Pollutants, Pollution sources, Pollution effects, Shores, Beaches, Coastlines, Oceans, Sea water, Legal aspects, Standards, Regulations, State governments, Federal government, Project purposes, Planning, Water management, Water development, Industry, Vessels, Ports, Harbors.

The imposition of liability regardless of fault on all oil-bearing tanker vessels, for all public and private property and commercial damage resulting from any accidental oil spill occurring adjacent to the coast is advocated. The magnitude and intensity of maritime oil pollution problems today, capacity to deal with accidental spills, and what to anticipate in the technological future are described. Past and present legislative assaults on accidental polluters is outlined. The imposition of absolute liability is proposed as a solution and various legal and economic bases for so doing are examined. The conclusion seeks to respond to possible practical challenges to the feasibility of implementing the proposal of absolute liability. (Silber-Florida)
W74-05779

INTERNATIONAL IMPACT REPORTS AND THE CONSERVATION OF THE OCEAN ENVIRONMENT,
Syracuse Univ., N.Y. Coll. of Law.
L. F. E. Goldie.
Natural Resources Journal, Vol 13, No 2, p 256-281, April 1973. 80 ref.

Descriptors: *Oceans, *Sea water, Development, *Long-term planning, *Pollution control, *International law, *International agreements, Mining, Effluents, Pollutants, Water resources, Water resources development, Water management, Water law, Legal aspects, Judicial decisions, Water policy, Water utilization, Water demand, Water control, Federal government, Environmental effects, Environmental sanitation, Conservation.

It has been suggested that one way to assure proper management and minimal adverse effects to undersea development, such as mining, would be to extend the requirement of impact studies and the permit system now used in the United States. Among the aspects to be considered in development of ocean resources is whether there will be any adverse environmental effects, or any irreversible or irretrievable commitment of resources. International interests must also be recognized and a worldwide agreement as to some conservation and environmentally protective policy must be reached to prevent wholesale raping of the ocean's wealth. Legislation analogous to the National Environmental Policy Act of 1970 (NEPA) is desirable to preserve and enhance the resources and prevent degradation to the oceans. Some references are made to litigation involving the NEPA to illustrate the judicial construction given to various provisions of the Act for future applications. Focusing on 'rights and amenities' and the nature of the obligation of full disclosure the courts recognize that among all of those competing interests, some practical solution must emerge to preserve these same resources for future generations. (Silber-Florida)
W74-05781

THE VALUE OF THE TIDAL MARSH,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 2L.
W74-05782

WHO GOVERNS LOCAL WATERS,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 6E.
W74-05784

LAFAYETTE PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commision on Coastal and Marine Resources, Baton Rouge.
For primary bibliographic entry see Field 2L.
W74-05785

LAKE CHARLES PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.
For primary bibliographic entry see Field 2L.
W74-05786

HAMILTON V. DIAMOND (PROCEEDING SEEKING TO HAVE PERMIT TO FILL HUDSON RIVER AT CERTAIN ADDRESS DECLARED ILLEGAL AND VOID).
For primary bibliographic entry see Field 6E.
W74-05789

A FOUL TIDE,
For primary bibliographic entry see Field 5B.
W74-05793

PENALTIES FOR WATER POLLUTION.
For primary bibliographic entry see Field 6E.
W74-05797

BIG CYPRESS CONSERVATION ACT.
For primary bibliographic entry see Field 6E.
W74-05798

A DOUBLE MARINE DISASTER,
For primary bibliographic entry see Field 5B.
W74-05800

SUPERIOR-MICHIGAN-HURON-ERIE-ONTARIO: IS IT TOO LATE,
G. Young.
National Geographic, Vol 144, No 2, p 147-185, August 1973. 17 photo.

Descriptors: *Great Lakes, *Bodies of water, *Lake beds, *Inland waterways, *Recreation, Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, Lake Superior, Lake breezes, Freshwater, Thermal properties, Self purification, Water levels, Lake shores, Lake fisheries, Lampreys, Aquatic life, Waste disposal.

Of the five Great Lakes only Lake Superior, the largest, has shown no increase in dissolved solids during a 60 year period. The lower Great Lakes are being sorely stressed by the cities, farms, and industries lining their shores, and by the polluted rivers flowing into them. Demographers predict that a complex of cities will ring Lakes Erie and Ontario and most of Lake Michigan causing pollution problems to increase. An extensive tour of the Great Lakes is described and many of the pollution problems facing them as well as some possible solutions are discussed. These solutions are immensely complex, for many sources of pollution and many jurisdictional units are involved. (Comfort-Florida)
W74-05801

CAN WE SAVE OUR SALT MARSHES,
Connecticut Agricultural Experiment Station, New Haven.
For primary bibliographic entry see Field 2L.
W74-05803

JACK AND THE DRAGLINE,
For primary bibliographic entry see Field 2L.
W74-05804

PROPOSED CHATTOOGA NATIONAL WILD AND SCENIC RIVER, NORTH CAROLINA, SOUTH CAROLINA, AND GEORGIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Forest Service (USDA), Washington, D.C.
Available from the National Technical Information Service, Springfield, Va, 22151, as EIS-NC-73-0589-F, for $4.25 paper copy, $1.45 microfiche. (1973). 58 p, 1 map, 2 photo.

Descriptors: *Environmental effects, Environmental control, Growth rates, Rivers, *Regulation, Management, Water policy, Vegetation, Georgia, South Carolina, North Carolina, Land use, *Wild River Act, Recreation, *Southeast U.S.
Identifiers: *Environmental impact statements, Jackson and Macon Co. N.C., Rabun Co. Ga., Oconee Co. S.C.

The Chattooga River flows through North Carolina, Georgia, and South Carolina. The proposal provides the means for protecting the river and adjacent lands from adverse environmental effects. The impact of increased recreational use will be controlled through regulations based on the carrying capacity of the river and land rather than on demand. The region around the river contains a rich variety of plant life, including a mixed composition of timber. In general, the immediate environment of the Chattooga is fragile, and overuse could result in deterioration and destruction of some of its unique plant life and aesthetic quality. The alternatives considered for the river's protection are: taking no action; development of the river for hydropower; and protection of the river through designation as a Federally administered river in the National Wild and Scenic Rivers System. (Daniels-Florida)
W74-05805

ENVIRONMENTAL QUALITY ANNUAL REPORT (3RD) OF THE COUNCIL ON ENVIRONMENTAL QUALITY.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-05807

ENVIRONMENTAL LAW--ZONING--ORDINANCE PROHIBITING FILLING OF WETLANDS ADJACENT TO NAVIGABLE WATERS, WITHOUT PERMIT IS CONSTITUTIONAL EXERCISE OF POLICE POWER NOT REQUIRING COMPENSATION.
For primary bibliographic entry see Field 6E.
W74-05815

FEDERAL COMMON LAW IN INTERSTATE WATER POLLUTION DISPUTES,
R. J. Trompeter.
University of Illinois Law Forum, Vol 1973, No 1, p 141-161, 1973. 145 ref.

Descriptors: *Pollution control, *Pollution abatement, *Judicial decisions, *Legal aspects, *Water law, Legislations, State governments, Federal government, Water rights, Water policy, Water control, Water management, Standards, Regulations, Cooperation, Pollution sources, Pollution effects, Environmental effects, Pollutants, Rivers, Streams, Lakes, Navigable waters, Water demand.

Since air and water pollutants never respect state boundaries, numerous lawsuits in which one state has sought abatement of polluting sources in another state have been heard since the turn of the century. Two questions become implicit. What demands are reasonable, and how is a state to make and enforce these demands. The Federal Water Pollution Control Act gave primary responsibility for control of water pollution to the states. This procedure was entangled with complex committees, conference and hearings and no party could find relief for at least a year after filing their complaint. In addition to being inefficient and time consuming, the Act's standards were wholly inadequate to deal with interstate pollution controversies. Each state could set its own standards or as some called them--'licenses to pollute.' Emerging from the ineptness of the Act, states have been invoking the original jurisdiction of the Supreme Court and contending that 'federal common law' must rule the substantive issues of the cases. In declining in Illinois v. Wisconsin to do so, on other grounds, the Supreme Court has recognized this 'federal common law' as a viable device to attack and solve interstate pollution disputes. (Silber-Florida)
W74-05816

ENVIRONMENTAL PROTECTION.
For primary bibliographic entry see Field 6E.
W74-05818

COMPLEX USE OF VOLGA WATER RESOURCES (KOMPLEKSNOYE ISPOL'ZOVANIYE VODNYKH RESURSOV VOLGI),
For primary bibliographic entry see Field 3F.
W74-05837

A REVIEW OF WASTEWATER PROBLEMS AND WASTEWATER MANAGEMENT PLANNING IN THE SAN FRANCISCO BAY REGION, CALIFORNIA.,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5D.
W74-05863

THE MANAGEMENT OF WATER IN ENGLAND AND WALES: THE CASE FOR REFORM,
Department of the Environment, London (England).
For primary bibliographic entry see Field 6B.
W74-05865

ENVIRONMENTAL QUALITY PLANNING - GOALS, POLICIES, AND OBJECTIVES.
East-West Gateway Coordinating Council, St. Louis, Mo.
For primary bibliographic entry see Field 6B.
W74-05876

WATER SUPPLY AND WATER POLLUTION CONTROL CAPITAL PROGRAM, 1972-1985.
Delaware Valley Regional Planning Commission, Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-05877

APPARATUS FOR REMOVING OIL AND OTHER FLOATING CONTAMINANTS FROM A MOVING BODY OF WATER,
Atomic Energy Commission, Washington, D.C. (assignee)
J. W. Strohecker.
U.S. Patent No. 3,779,385, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 917, No 3, p 960, December 18, 1973.

Descriptors: *Patents, Oil spills, *Oil pollution, *Pollution abatement, *Flotsam, *Skimming, Separation techniques, Water pollution control, Water quality control, Equipment, Weirs.

Floating contaminants such as oil and solid debris are removed from a moving body of water by employing a skimming system which utilizes the natural gravitational flow of the water. A boom diagonally positioned across the body of water diverts the floating contaminants over a floating weir and into a retention pond where an underflow weir is used to return contaminant-free water to the moving body of water. The floating weir is ballasted to maintain the contaminant-receiving opening so that it is slightly below the surface of the water during fluctuations in the water level. This permits skimming the contaminants with minimal water removal. (Sinha-OEIS)
W74-05881

OIL RECOVERY SYSTEM,
Bridgestone Tire Co. Ltd., Tokyo (Japan). (assignee)
T. Muramatsu, K. Aramaki, and Y. Kondo.
U.S. Patent No. 3,771,662, 5 p, 7 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 916, No 2, p 538, November 13, 1973.

Descriptors: *Patents, Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control, Separation techniques.
Identifiers: *Oil fence, Oil films.

An oil fence assembly includes an elongated belt having two parallel longitudinal edges each of which can flex in a longitudinal direction. A flexible float, preferably tubular, connects to the belt so as to extend in the longitudinal direction of the belt. The U-shaped oil fence is moved on the water surface so as to sweep the spilled oil into an area defined between two leg portions. An oil-collecting zone is formed in the U-shaped oil fence line, where all the oil films swept thereby are collected to form a comparatively thick oil film. The oil may be removed from that zone. (Sinha-OEIS)
W74-05886

DYNAMICALLY EFFECTIVE OIL-GUIDE-BOOM AND METHOD FOR PURIFYING WATER EMPLOYING THE SAME,
H. R. Steltner.
U.S. Patent No. 3,779,382, 4 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 917, No 3, p 959, December 18, 1973.

Descriptors: *Patents, Oil spills, *Oil pollution, *Skimming, *Water purification, *Pollution abatement, Water quality control, Water pollution control.

An oil-guide-boom which is effective in the removal of surface oil and residue from flowing water is disclosed. The boom includes two support members and a sheet extending between the supports in a trough-like manner. The sheet comprises a wire mesh material and a non-woven fabric. In operation the boom is placed in water toward the direction of flow so as to allow water to pass through the mesh portion of the sheet and to collect in the trough portion of the sheet. The boom has particular utility in that its structure and materials allow continuous removal of surface impurities from flowing water. Method of purifying water containing oil on the surface which utilizes the oil-guide-boom is also disclosed. (Sinha-OEIS)
W74-05888

VORTEX OIL-WATER SEPARATOR SYSTEM PROVIDING CLEAN WATER,
United Aircraft Corp., East Hartford, Conn.
D. P. Miller.
U.S. Patent No. 3,780,865, 5 p, 5 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 917, No 4, p 1327, December 25, 1973.

Descriptors: *Patents, *Oil pollution, *Pollution abatement, *Separation techniques, Equipment.
Identifiers: Ballast, Bilge water, *Vortex separator.

A vortex separator is used to separate a mixture of materials of different densities, such as an oil-water mixture, into two components. The mixture is injected tangentially into one end of a cylindrical chamber at a high flow rate to impart a swirl to the flow in the chamber. Clean or recirculated water is injected into the chamber from the opposite end wall. The separated water is exhausted from the chamber through a port in the center of the end wall containing the water injectors, and the separated oil is exhausted through a small duct located at the center of the water exhaust port. Two or more separators may be connected in series for applications in which a ship's ballast or bilge water is separated into a first component containing primarily oil which can be stored in a small volume, and a second component of substantially pure water which may be dumped overboard. A baffle plate may be added in the chamber to improve the separation process. (See also W74-05894) (Sinha-OEIS)
W74-05893

VORTEX OIL-WATER SEPARATOR SYSTEM PROVIDING CLEAN WATER,
United Aircraft Corp., East Hartford, Conn.
A. E. Mesing.
U.S. Patent No. 3,780,862, 5 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 917, No 4, p 1326, December 25, 1973.

Descriptors: *Patents, *Oil pollution, *Pollution abatement, *Separation techniques, Equipment, Water pollution control, Water quality control.
Identifiers: Ballast, Bilge water, *Vortex separator.

A vortex separator is used to separate a mixture of materials of different densities, such as an oil-water mixture, into two components. The mixture is injected tangentially into one end of a cylindrical chamber at a high flow rate to impart a swirl to the flow in the chamber. Clean or recirculated water is injected into the chamber from the opposite end wall. The separated water is exhausted from the chamber through a port in the center of the end wall containing the water injectors, and the

separated oil is exhausted through a small duct located at the center of the water exhaust port. Two or more separators may be connected in series for applications in which a ship's ballast or bilge water is separated into a first component containing primarily oil which can be stored in a small volume, and a second component of substantially pure water which may be dumped overboard. A baffle plate may be added in the chamber to improve the separation process. This patent contains subject matter related to patent no. 3,780,865. (See W74-05893) (Sinha-OEIS)
W74-05894

METHOD FOR SEPARATING OIL FROM A MIXTURE OF OIL AND WASTE WATER FROM AN OFFSHORE RIG,
C. J. Carmichael, and A. G. Franklin.
U.S. Patent No. 3,781,201, 1 p, 2 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 917, No 4, p 1415, December 25, 1973.

Descriptors: *Patents, Gypsum, Lime, *Oil pollution, *Pollution abatement, *Offshore platforms, Water pollution control, Water quality control, *Separation techniques.

The method of separating oil from a mixture of oil and waste water from an offshore rig comprises of introducing the oil water mixture to a primary skimmer tank where oil that quickly separates from the water is skimmed off into a blow case. Water is introduced from the bottom of the primary skimmer tank into a mixing tank where a mixture consisting essentially of gypsum and lime is introduced into the mixing tank. Thereafter the gypsum-oil, excess gypsum and other solids are mechanically separated from the water and the clean water is discharged overboard. (Sinha-OEIS)
W74-05897

CONVERTIBLE BARRIER FOR SUBSTANCES FLOATING ON WATER,
P. Preus, and J. J. Gallagher.
U.S. Patent No. 3,783,621, 3 p, 7 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 918, No 2, p 577, January 8, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, Equipment, *Pollution abatement, Water quality control, Water pollution control, Separation techniques.

A barrier adapts to contain oil slicks under any water condition. It consists of liquid pervious and liquid impervious skirts. The liquid impervious skirt is deflected at currents greater than about one knot and the oily substances are treated with a particulate oleophilic hydrophobic substance less dense than water for retention by the liquid pervious skirt. The barrier comprises a flotation collar with the skirts depending from it in parallel-planar, coextensive relationship. The flotation collar may be an inflatable tube or it may be made of a flotable material such as polystyrene or polyethylene foam, or an oleophic-hydrophobic material. (Sinha-OEIS)
W74-05902

OZONATING APPARATUS FOR DRINKING WATER,
Moody Aquamatic Systems, Inc., Meadville, Pa. (Assignee).
For primary bibliographic entry see Field 5F.
W74-05904

METHOD AND SYSTEM FOR THE CONTAINMENT AND SALVAGE OF CHEMICALS AND OILS AT SEA,
C. L. Gambel.
U.S. Patent No 3,783,622, 7 p, 8 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 918, No 2, p 577, January 8, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Chemical wastes, Barriers, *Pollution abatement, Water quality control, Water pollution control, Equipment, Separation techniques.

Rigid barrier units are deployed around a surface area of a body of water which is to be enclosed in order to contain an oil spill or a chemical contaminant. Each unit is provided with adjustable buoyancy and ballasting chambers so that a nearly neutral buoyancy condition can be established. A substantial mass of the unit rests below the turbulence level of the water. The units are linked by hinge sections positioned at the ends of each unit and are mounted to move relative to their respective barrier units about horizontal axes that are perpindicular to the main longitudinal axis of the barrier unit. Hinge sections can be coupled to provide for pivotal movement about a common vertical axes. (Sinha-OEIS)
W74-05908

THE PHYSICAL SETTING OF THE COLORADO RIVER BASIN,
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 4A.
W74-05921

OPTIMAL PLANNING FOR A THERMAL DISCHARGE TREATMENT SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 5D.
W74-05933

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, FOURTH VOLUME.
Office of Water Resources Research, Washington, D.C.
Available from the National Technical Information Service as PB-229 894, $9.75 in paper copy, $1.45 in microfiche. Water Resources Scientific Information Center, Report WRSIC 73-218, December 1973. 490 p, 323 ref.

Descriptors: *Systems analysis, *Bibliographies, Water resources, *Optimization, *Simulation analysis, Operations research, Abstracts, Alternative planning, *Management, *Planning, Evaluation.

An annotated bibliography containing 323 abstracts is presented of selected publications issued in 1971 and 1972 pertaining to the application of systems analysis techniques for defining and evaluating alternative solutions to water resource problems. The first two volumes of this bibliography, having the same title, were published by the Cornell University Water Resources and Marine Sciences Center, Ithaca, New York (Publication 25, August 1969; Publication 35, June 1971); the third volume was published by the Water Resources Scientific Information Center in December 1972. Both subject and author indexes are provided. Descriptors are listed with each abstract. The abstracted material emphasizes the application of optimization and simulation techniques for assisting in the planning and management of water resource systems.
W74-05401

EXTENDED PERIOD SIMULATION OF WATER DISTRIBUTION NETWORKS,
Systems Control, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 4A.
W74-05533

POPULATION GROWTH, RESOURCE AVAILABILITY AND ENVIRONMENTAL QUALITY,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-05614

AN OPERATIONAL MATHEMATICAL PROGRAMMING MODEL FOR THE PLANNING OF ECONOMIC ACTIVITIES IN RELATION TO THE ENVIRONMENT,
Netherlands School of Economics, Rotterdam. Economic Research Inst.
For primary bibliographic entry see Field 6B.
W74-05616

APPLICATION OF MICROECONOMIC MODELS TO REGIONAL ENVIRONMENTAL QUALITY MANAGEMENT,
Resources for the Future, Inc., Washington, D. C.
C. S. Russell.
American Economic Review, Vol 63, No 2, p 236-243, 1973. 22 ref.

Descriptors: *Model studies, *Environmental effects, *Decision making, Costs, Economic impact, Environmental control, Standards, Regional analysis, Mathematical models.
Identifiers: *Microeconomic models, Ambient quality standards, Steepest ascent method.

Microeconomic models presently used to examine environmental quality problems generally concentrate on the costs of reducing or modifying discharges. Such models are designed to find the most efficient way of meeting exogenously given standards for either discharges or ambient quality. The choice between the two is the result of potential policy choices of the public agency, number of sources for which discharge reduction cost function need be developed, and the complexity of the environmental model used. Models currently being developed at Resources for the Future (RFF) are similar to earlier models that were subject to ambient standards. These RFF models are divided conceptually into three parts: one dealing with discharge, production and consumption activities; a second transforming discharges into ambient conditions; and a third, comparing ambient conditions to standards or entering them into damage functions. RFF models are distinguishable from classical forms as they deal with all waste forms and their interactions simultaneously. Activities are also extremely flexible, allowing non-constant cost and input and process substitutions. Information is also generated on the distribution of impacts from potential environmental management decisions. Solutions are found in newly developed RFF models using essentially the steepest ascent method, found primarily in non-linear programming. (Schroeder-Wisconsin)
W74-05627

ALTERNATIVE WATER RESOURCE SYSTEMS IN THE LOWER MEKONG,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand).
K. Chaemsaithong, L. Duckstein, and C. C. Kisiel.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY3, Paper 10430, p 461-475, March 1974. 3 fig, 2 tab, 28 ref.

Descriptors: *Water resources development, *River basin development, *Asia, Cost-benefit analysis, Economics, Hydroelectric power, Flood control, Mathematical models, Optimization, *Alternative planning.
Identifiers: *Lower Mekong Basin.

A systematic method is given for evaluation of alternative water resources systems with particular reference to the development of water resources in the Lower Mekong Basin. In the evaluation process, the development goals that may be of an

economic or social nature are explicitly stated and transformed into specifications. The approach requires that distinct alternatives be sought and compared using both quantitative and qualitative criteria. A decision to select an alternative can be reached by use of a fixed-cost or fixed-effectiveness approach. Sensitivity analysis in the approach takes into account uncertainty in hydrologic and economic data. (Knapp-USGS)
W74-05733

MASTER PLANNING METHODOLOGY FOR URBAN DRAINAGE,
Rice (Leonard) Consulting Water Engineers, Denver, Colo.
H. F. Bishop.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10290, p 189-199, January, 1974. 4 fig, 12 ref.

Descriptors: *Planning, *Urban hydrology, *Urban runoff, *Water reuse, Data collections, Data processing, Urban drainage, *Flood control, Systems analysis, Water management(Applied), *Colorado.
Identifiers: *Denver(Colo).

Effective operation and maintenance of the urban environment requires the coordinated management of the various elements of the urban area. One of the principal elements of the urban system is that of water resource management which includes urban drainage and flood control. A systems engineering methodology was developed for master planning of the major drainage system in the Denver area under Project REUSE (Renewing the Environment through Urban Systems Engineering). The methodology incorporates a functional description of the urban drainage system and a systematic process of data acquisition, runoff analysis, concept identification and selection, and master plan development and implementation. (Knapp-USGS)
W74-05834

INTERREGIONAL PLANNING OF WATER RESOURCES ALLOCATIONS BY SYSTEMS ANALYSIS APPROACH,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 4A.
W74-05932

OPTIMAL PLANNING FOR A THERMAL DISCHARGE TREATMENT SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 5D.
W74-05933

OPTIMUM RESERVOIR OPERATING POLICIES AND THE IMPOSITION OF A RELIABILITY CONSTRAINT,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-05934

A USEFUL THEOREM IN THE DYNAMIC PROGRAMMING SOLUTION OF SEQUENCING AND SCHEDULING PROBLEMS OCCURRING IN CAPITAL EXPENDITURE PLANNING,
Northwestern Univ., Evanston, Ill. Dept. of Industrial Engineering and Management Sciences.
For primary bibliographic entry see Field 6B.
W74-05935

MULTIPLE-OBJECTIVE OPTIMIZATION IN WATER RESOURCE SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Electrical Engineering.
V. Vemuri.
Water Resources Research, Vol 10, No 1, p 44-48, February 1974. 2 fig, 1 tab, 8 ref.

Descriptors: Water resources, *Planning, *Management, *Optimization, *Methodology, Equations, Reservoir storage, Reservoir releases, Mathematical models, Systems analysis.
Identifiers: *Multiple-objective optimization, *Noninferior solutions, Auxiliary scalar optimization.

Multiple-objective optimization problems arise naturally in resource management projects. A chief difficulty with multiple-objective optimization is that it is no longer clear what one means by an optimal solution. A possible remedy to this situation is to refine the concept of 'optimal solution' by introducing the so-called 'noninferior solution set.' Then optimization, in a multiple-objective context, boils down to determining the set of noninferior solutions. Determination of the noninferior set is facilitated by relating it, in a one-to-one manner, to a family of auxiliary scalar optimization problems. For a certain class of problems the entire noninferior set can be obtained by solving the auxiliary scalar problem. This procedure is illustrated, considering the problem of determining the optimum storage capacity of a reservoir subject to a specified set of release rules. For demonstration purposes, some simplifications are made. The applicability of this method is presently restricted to the use of a particular functional form for each vector index and no constraints. Further research is needed to extend this method to more general forms of performance indices and to problems in which decision and state variable constraints are present. (Bell-Cornell)
W74-05936

OPTIMAL DESIGN AND OPERATION OF WATER DISTRIBUTION SYSTEMS,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 4A.
W74-05937

MODELING THE REGULATION OF LAKE SUPERIOR UNDER UNCERTAINTY OF FUTURE WATER SUPPLIES,
Sun Oil Co., Dallas, Tex.
For primary bibliographic entry see Field 4A.
W74-05938

6B. Evaluation Process

WATER ALLOCATION MODELS BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN,
Florida Univ., Gainesville. Dept. of Food and Resource Economics.
J. E. Reynolds, J. R. Conner, K. C. Gibbs, and C. F. Kiker.
Available from the National Technical Information Service as PB-229 636, $5.00 in paper copy, $1.45 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 26, 1973. 147 p, 19 fig, 22 tab, 36 ref, 3 append. OWRR B-005-FLA(4), OWRR B-007-FLA(12). 14-31-0001-3069, 14-31-0001-3267.

Descriptors: *Water allocation(Policy), Water values, Water utilization, Water demand, Decision making, Model studies, *Simulation analysis, *Florida, *Water distribution(Applied), *Alternative water use, Linear programming, *Mathematical models, Water policy, Operations.
Identifiers: Water allocation models, *Kissimmee River basin(Fla), *Operational policy.

Two types of models for allocating water among alternative uses and between watersheds in the Kissimmee River Basin were developed and empirically evaluated. The value of water in agricultural and recreational uses was estimated for use in the allocation models. A linear programming model of the hydrologic-economic system was developed to determine the economic consequences of broad operational policy alternatives and the relative trade-offs based on economic returns from water allocation among different uses, locations and time periods. A simulation model that incorporated hydrologic and physical relationships for the basin was evaluated as an alternative type of water allocation model. The two different types of water management models evaluated in this study can serve different purposes. The simulation model, because of its detailed approach, is best suited for developing and evaluating specific operational policies for individual basins. The linear programming model is better suited for assessing effects of broad operational policy alternatives and for determining optional choices. This study demonstrated the feasibility and usefulness of water management system modelling as a means of providing information for selecting water management policy alternatives. (Morgan-Florida)
W74-05402

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO: MIDDLE RIO GRANDE REGION,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
R. R. Lansford, S. Ben-David, T. G. Gebhard, Jr., W. Brutsaert, and B. J. Creel.
Available from the National Technical Information Service as PB-229 671, $4.50 in paper copy, $1.45 in microfiche. New Mexico Water Resources Research Institute Report No. 022, Partial Technical Completion Report, 1973. 99 p, 14 fig, 36 tab, 1 append, 67 ref. OWRR A-045-NMEX(3).

Descriptors: *New Mexico, Water resources, *Water demand, Economics, *Alternative water use, *Water resources development, *Management, *Economic prediction, *Surface-groundwater relationships, Natural resources, Water requirements, Resource allocation, River basins, Groundwater management, Water law, Interstate compacts, International compacts, Treaties, Litigation, Water quality, *Water utilization, Human population, Employment, Industrial water, Recreation, Water management(Applied), Linear programming, *Rio Grande River.
Identifiers: *Socioeconomic models, Groundwater appropriation, Input-output coefficients, Surface-groundwater conjunctive use model, Economic land classification, Groundwater models, Irrigation water diversions.

An interdisciplinary approach to the solution of the water resource problems of the Middle Rio Grande Region in New Mexico was centered around a socio-economic model, with special emphasis placed upon the Rio Grande Region. Inputs into the socio-economic model were obtained from separate studies. Three sets of alternatives were considered: (1) Without a water constraint, in the Rio Grande Region, both production and depletions are expected to exhibit the largest increase (59.7 percent and 47.4 percent, respectively); (2) When a surface water constraint is imposed, the value of production is reduced by $18.1 million in 2020 and water depletions are expected to decrease about 18.1 percent by 2020; (3) When a total water constraint is imposed, the value of production is decreased $4.1 million below that expected when using only a surface water constraint, and water depletions reduced about 8.4 percent. The Middle Rio Grande Region is expected to follow the general trend of the total Rio Grande region but at a higher growth rate. The expected increase in total value of production from 1970 to 2020 is 62.0 percent, employment 62 percent, and water depletions about 61 percent. When a surface-water constraint is imposed, production is expected to be reduced $3.2 million in 2020, employment by 154 employees, and water depletions by 51,633 acre-feet. When an additional constraint is imposed on ground water in the MRGR, produc-

tion would be decreased $2.0 million in 2020, employment by an additional 99 employees, and water depletions by 38,390 acre-feet. (Hain-New Mexico)
W74-05408

NEW DIRECTIONS IN U.S. WATER POLICY--SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FROM THE FINAL REPORT OF THE NATIONAL WATER COMMISSION.
National Water Commission, Arlington, Va.
Available from GPO, Washington, D.C. 20402 Price $2.50. Summary of National Water Commission Final Report to the President, House of Representatives and Senate, 1973. 197 p, 4 append.

Descriptors: *National Water Commission, *Water resources development, *Water law, Governments, Water policy, Water transfer, Economics, Water costs, Water utilization.

The National Water Commission, created by Act of Congress in 1968 to review national water resources problems, submitted its report and recommendations to the President and the Congress on June 15, 1973. Because the full report is a document of nearly 600 pages, a summary is presented for those who dc not wish to take the time to read the complete report. Water is one of many resources that must be managed prudently for the national good. Prudent management requires the pursuit of sound economic policies to increase national wealth and of wise environmental policies which promote the health and happiness of the people and protect the life-supporting ecological systems of the earth. Institutions and procedures must be adequate to the task of identifying policy questions, of analyzing the issues on an information base broad enough to predict results, and then of making decisions. The legal system must provide the means of implementing policy decisions while protecting the rights of individuals. In particular, there is need to modernize laws dealing with groundwater. Up until very recently insufficient attention has been given regulation of groundwater as part of the total water resource, and as something which should be closely coordinated with regulation of surface waters. Not only is groundwater a major source of water supply for agriculture, industry, and municipalities, it is susceptible to pollution which can be even more serious than pollution of surface waters. Development, management, and protection of water resources should be controlled by that level of government nearest the problem and most capable of effectively representing the vital interests involved. Regional and State entities, as well as local units of government, should assume increasing roles in the control of water resources use and preservation. (See also W73-12052) (Knapp-USGS)
W74-05522

MEASURING THE INTANGIBLE VALUES OF NATURAL STREAMS, PART II, PREFERENCE STUDIES AND COMPLETION REPORT,
Kentucky Water Resources Inst., Lexington.
J. A. Dearinger, G. M. Woolwine, C. R. Scroggin, D. R. Dolan, and J. S. Calvin.
Available from the National Technical Information Service as PB-229 838; $14.00 in paper copy, $1.45 in microfiche. Research Report No. 66, December 1973. 207 p, 52 fig, 15 tab, 10 append. OWRR B-015-KY(2). 14-31-001-3086.

Descriptors: *Aesthetics, Psychological aspects, Scenery, Value, *Intangible benefits, Intangible costs, Conservation, Environmental effects, Recreation, Regional analysis, Planning, *Kentucky, Attitudes, *Motivation, *Behavior, Regression analysis, Evaluation, Wild rivers, *Natural streams.
Identifiers: *Psychometric analysis, Uniqueness concept, Scenic rivers.

This report describes the work done during Part II of a project which had as its aim the development of a way to quantify those intangible values peculiar to a small stream and its watershed. Part I was concerned with an application of the 'uniqueness concept' in the evaluation of a fifty-eight Kentucky streams. The results of this effort are in Report Number 40, U.K. Water Resources Institute (1971), (See W71-11859). During the second part of the project: (1) A method was developed whereby peoples' preferences for natural landscapes could be measured. The method utilized projected color slides and a rating system based on the semantic differential. (2) Fourteen preference studies were conducted using different types of subjects and stimuli (color slides). (3) The data were factor analyzed and scores computed for three factors (Natural Beauty, Force and Starkness) for each slide-subject group combination. (4) The scenic content of each slide was measured and related to the factor scores by a series of linear regression equations. (5) The uniqueness ratio approach was modified to include fewer stream characteristics (thirty-seven) and the work of Part I essentially repeated. (6) A new method of stream evaluation was developed which yields a factor score for a given stream on each of six factors (Scenic Attractiveness, Land Use-Topo, Litter, Aquatic Habitat, Extractive Industry, Development). (Grieves-Kentucky)
W74-05538

THE COLUMBIA RIVER TREATRY: THE ECONOMICS OF AN INTERNATIONAL RIVER BASIN DEVELOPMENT,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-05585

LEGISLATIVE FRAMEWORK FOR WATER RESOURCES MANAGEMENT IN ALABAMA.
Alabama Univ., University. Natural Resources Center.
For primary bibliographic entry see Field 6E.
W74-05590

POPULATION GROWTH, RESOURCE AVAILABILITY AND ENVIRONMENTAL QUALITY,
Resources for the Future, Inc., Washington, D.C.
J. L. Fisher, and R. G. Ridker.
American Economic Review, Vol 63, No 2, p 79-89, May 1973. 1 fig, 2 ref.

Descriptors: *Population, Environment, Natural resources, Technology, *Resource allocation, Model studies, *Mathematical model, Regulation, Decision making, Planning, *Pollution abatement, Social aspects, Gross National Product.
Identifiers: *Environmental quality, *Economic growth, Raw materials, Population growth, Birth control, Resource availability.

The interrelationships of population, resources, and environment are examined in order that more coherent industrial and governmental policies might be formulated to meet environmental problems. Use of a mathematical model of the economy together with a comparison of model results with conventional studies of specific sectors such as agriculture and energy led to the conclusion that the United States is not likely to experience serious shortages of raw materials during the next 30 to 50 years as a result of projected population and economic growth. Population growth becomes more important as the time framework increases, but in the short term, technology, consumer tastes, and public policies have a more important impact on resources and the environment. Direct attacks on pollution problems through an active pollution abatement policy easily dominates over reductions in population and economic growth as a means of obtaining a cleaner environment. Critical elements for any understanding of the population, resources and environment interrelationship include the time horizon of the analysis, the geographic area under consideration, the technological, behavioral and institutional setting, and the composition of production and consumption. The importance of continuously monitoring the interrelationship is shown and a number of the more significant policy directions are noted. (Slattery-Wisconsin)
W74-05614

AN OPERATIONAL MATHEMATICAL PROGRAMMING MODEL FOR THE PLANNING OF ECONOMIC ACTIVITIES IN RELATION TO THE ENVIRONMENT,
Netherlands School of Economics, Rotterdam. Economic Research Inst.
F. Muller.
Socio-economic Planning Sciences, Vol 7, No 2, p 123-137, 1973.

Descriptors: *Environmental effects, *Industrial production, *Mathematical models, *Economic impact, Linear programming, Economic justification, Social impact, Regional economics, Industrial wastes, Input-output analysis, Diffusion, Constraints, Pollution abatement, Investment, National income, Welfare(Economics), Decision making.
Identifiers: *Environmental quality.

Three models are developed to illustrate the effects of increased production on the environment. These models have in common an input-output submodel which relates inputs, outputs, final demand and pollution emissions. Emissions are dispersed throughout the region using a diffusion submodel. This submodel provides decision makers with the impacts of production decisions on any regional sector's environmental quality. In models one and two, the region's contribution to the national income is maximized, subject to any sector's available labor supply and minimum productions standards, using linear programming. The second model limits the concentration of each pollutant within every sector. Duals, which yield the marginal benefits gain from the relaxation of environmental constraints, are ranked and compared with the investment costs necessary to reduce emissions. Model three possesses a non-linear objective function, constraints, and explicitly considers the changes in investments. A step-wise method is developed to solve this problem. All models allow a number of pollution abatement practices to be incorporated including changes in production levels, production processes, input substitutions, locational changes, abatement investment and recycling. Input-output, pollution and diffusion data are necessary to operate each model. (Schroeder-Wisconsin)
W74-05616

ENVIRONMENTAL IMPACT AND WATER DEVELOPMENT,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 6G.
W74-05619

COMPETING VALUES IN WATER DEVELOPMENT,
Committee on Interior and Insular Affairs (U. S. Senate). Subcommittee on Water and Power Resources.
D. A. Dreyfus.
Journal of the Hydraulics Division, Proceedings of the American Society of Civil Engineers, Vol 99, No HY9, p 1599-1604, 1973. 4 ref.

Descriptors: *Social values, *Social participation, *Future planning(Projected), Division making, Resources development, Water resources, Environment, Attitudes, Alternative planning.
Identifiers: *Resource management.

Nowhere else in the United States' public sector have changing societal values been as pronounced as in the rejection of existing resource management concepts. These value changes have been exacerbated by the exponential growth of the American economy and the growing environmental movement, a growth which has forced a number of critical resource management decisions. Previously resource managers have applied the utility concept to planning by extrapolating basic indicators, such as GNP, into the future then mechanically converting these into the demand for products and services. The projected need is considered a justification and mandate for action and plans are made to fulfill such projections. Critics of this approach contend that projected increased demands are not inevitable, not do they reflect public choice; indeed such projection may induce self-fulfilling prophesies. Even when the needs are real, the utility approach fails to consider alternative management plans which may have less objectionable side effects. An alternative management strategy would utilize a desired rather than projected future and alternative plans would be ranked according to their ability to meet desired outcomes. The discovery of desired futures would imply greater citizen participation which in itself may make the public sector responsive to evolving social values. (Schroeder-Wisconsin)
W74-05620

PARKLAND PLANNING AND LAKE MANAGEMENT IN THE ROCK RIVER BASIN.
Wisconsin Univ., Madison. Inst. for Environmental Studies.
IES Report 14, November 1973. 49 p, 2 fig, 1 tab, 41 ref.

Descriptors: *Recreation, *Parks, *Comprehensive planning, Lakes, Rehabilitation, Watershed(Basins), *Wisconsin, Decision making, Community development, Urbanization, Institutions, Financing, Land use, *Management, Reclamation, Carp, Riprap, Zoning, *Regional analysis.
Identifiers: Jefferson County(Wis.), Lake Koshkonong(Wis.), *Rock River basin(Wis.), *Environmental Impact Statements.

Actual resource management problems within the context of local or regional planning and administration considers Lake Koshkonong, Wisconsin improvement and its problems and possibilities, together with development of Jefferson County recreation parklands. After reviewing the problems and proposed alternatives in Lake Koshkonong, only the riprap program and improved zoning action is endorsed at this time. The study of parkland planning and development policy in Jefferson County, Wisconsin considers how much parkland is needed and what are the appropriate acreage and activity standards; who should pay for the acquisition, development, and maintenance of the county park system; to what extent should new park areas be developed; what land classifications should and should not be used for recreation; and whether stronger recreational regulatory authorities and expanded administrative investments are needed to maintain quality parkland and recreational facilities. State and federal ligislation and procedures available to counties for making environmental impact assessments are outlined. Guidelines for preparing and reviewing environmental impact statements are provided and suggestions are given for raising environmental questions in local project planning even when environmental impact statements are not formally required, with examples based on Jefferson County. (Jones-Wiscosi
W74-05624

75 WATER ASSESSMENT. DRAFT PLAN OF STUDY.
Water Resources Council, Washington, D. C.
July 1973. 52 p, 6 fig, 2 tab.

Descriptors: *Water supply, *United States, *Assessment, Water demand, *Evaluation, Water resources, *Planning.
Identifiers: Water Resources Council, 1975 water assessment, Study plan.

The plan for the assessment of the nation's water supplies by the Water Resources Council is prepared in order to identify existing and emerging water and related resource problems, judge their severity and their urgency for resolution by various governmental actions. The assessment format is carefully described. The initial step is the development of a range of potential water requirements based on a set of regional and national projections of economic activities (OBERS). Next, an evaluation is made of imbalances between current (1975) water supplies and future requirements. Two separate studies will be conducted: the first analyzes the problem on a national basis, the second to pinpoint specific problem areas not covered in the national study. Information gathered in this second step will be compiled to show the economic, social, and environmental impacts of projected deficiencies. Using this information for Step 3, the National Programs and Assessment Committee and regional sponsors' selected judges will rank the severity of these deficiencies according to a consistent set of criteria to be developed. Ranking will be shown in a draft report soliciting public response. Step 4 recommendations will involve identifying problems having the greatest national interest and suggesting appropriate future federal roles. (Schroeder-Wisconsin)
W74-05626

THE PROCEEDINGS OF A NATIONAL SYMPOSIUM ON COSTS OF WATER POLLUTION CONTROL.
North Carolina Research Triangle Universities, Raleigh; and Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05629

ECONOMIC IMPLICATIONS OF ALTERNATIVE NATIONAL POLICIES FOR WATER POLLUTION CONTROL,
Environmental Protection Agency, Washington, D.C. Planning and Evaluation Branch.
For primary bibliographic entry see Field 5G.
W74-05630

ECONOMIC IMPLICATIONS OF ALTERNATIVE NATIONAL GOALS,
National Wildlife Federation, Washington, D. C.
For primary bibliographic entry see Field 5G.
W74-05631

COST EFFECTIVENESS OF CURRENT ENVIRONMENTAL ENGINEERING PRACTICES,
Camp, Dresser McKee, Boston, Mass.
For primary bibliographic entry see Field 5G.
W74-05633

POLLUTION CONTROL POLICY AND THE EFFICIENT ALLOCATION OF RESOURCES,
Council of Economic Advisors, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05637

BENEFIT-RELATED EXPENDITURES FOR INDUSTRIAL WASTE TREATMENT,
Syracuse Univ., N.Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-05641

AQUACULTURE: ECONOMIC FEASIBILITY IN THE GREAT LAKES AREA,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
W. D. Dobson.
In: Proceedings of Fourth National Sea Grant Conference, October 12-13, 1971, Madison, Wisconsin, 1225 West Dayton Street, Sea Grant Program, University of Wisconsin, Madison, p 89-98. 3 tab, 15 ref.

Descriptors: *Aquiculture, *Fish, *Great Lakes, *Economic feasibility, Water pollution, Effluents, Catfishes, Perches, Trout, Shrimp, Thermal pollution, Pikes, Powerplants, Demand, Marketing.
Identifiers: Japan, Great Britain, Chub, Advertising.

Despite its economic potential to Great Lakes area processors, capital will not flow into aquaculture until certain economic and technical problems can be solved. One primary problem is to keep water heating costs down. Problems such as lack of available research information, supply of broodstock, and availability of low cost credit, could be solved through a program of public assistance to aquaculture growers. While aquaculturally produced fish will be easier to market and merchandise than wild fish, the demand for fish may grow slowly unless a strong advertising and promotional program is implemented. Currently in the planning or experimental stage is the use of thermal discharges for aquaculture. Included are several catfish raising experiments in the United States, as well as shrimp and yellowtail experiments in Japan, and successful experimental work in Great Britain. While problems exist in the use of thermal discharge for fish raising, experimental information suggests that economically viable systems of this type might be developed. A viable aquacultural industry, which would include adequate demand for fish products, could aid the continued economic growth of the Great Lakes region. (See also W74-05644) (Pinsky-Wisconsin)
W74-05648

COMPATIBILITY OF PETROLEUM ACTIVITIES IN THE COASTAL ZONE,
Humble Oil and Refining Co., Houston, Tex.
J. R. Jackson, Jr.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 48-55, 1972. 7 fig.

Descriptors: *Water resources development, *Oil industry, *Coasts, Natural resources, Optimal development plans, Compatibility, Tourism, Fishing, Gulf of Mexico.
Identifiers: *Coastal Zone management.

The relation between oil consumption and GNP and regional economic development is presented as evidence of the strategic importance of the oil industry in maintaining our current standard of living and its future improvement. The compatibility of oil resources development and other coastal resources such as fish and recreation is described. It is pointed out that diverse activities can coexist in harmony if the concept of compatible use is applied in their management. The compatible use concept is a flexible framework of use priorities in which long-term social and economic benefits are maximized. If one use is paramount, other uses should be permitted to the extent that they do not interfere with the dominant use. Possible unreasonable interferences are considered and shown to be insignificant. (See also W74-05651) (Weaver-Wisconsin)
W74-05656

AREA-OF-ORIGIN PROTECTIONISM IN WESTERN WATERS,
Department of the Environment, Ottawa (Ontario). Water Planning and Management Branch.
F. J. Quinn.
Inland Waters Directorate, Social Science Series No 6, 1973. 95 p, 12 fig, 15 tab. 248 ref.

Descriptors: *Inter-basin transfers, Water resources development, Political aspects, *Political constraints, *Canada, Social aspects, Environment, Governments, *Water law, Conservation, *Institutional constraints.
Identifiers: *Protectionism(Area of origin).

Public interest has focused so completely on proposals for inter-regional and international water diversion, few have noticed the effective opposition to them put forth by those areas with the most to lose. No area of streamflow origin in the North American West has ever parted willingly with its water. Area-of-origin motivations, past successes in state statutes and interstate compacts, strategies employed in and out of Congress, and prospects in the continuing struggle are discussed. No better example of protectionist strategy exists than that of the Pacific Northwest states in successfully opposing legislation providing for studies of means to augment the water supplies of the Colorado Basin. The two-pronged effort of Northwestern leaders--to reorganize and close divisions in their own ranks at home while taking advantage of national sentiment for conservation and comprehensive planning to counteract diversion proposals in Congress--is followed in detail. Federal and provincial jurisidctions in Canada are explored. Analogies with the sale of other Canadian resources across the international border are found not to be very relevant, given the stronger environmental context of water. (Knapp-USGS)
W74-05854

A REVIEW OF WASTEWATER PROBLEMS AND WASTEWATER MANAGEMENT PLANNING IN THE SAN FRANCISCO BAY REGION, CALIFORNIA.,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5D.
W74-05863

THE MANAGEMENT OF WATER IN ENGLAND AND WALES: THE CASE FOR REFORM,
Department of the Environment, London (England).
J. E. Beddoe.
Town and Country Planning, Vol 40, No 9, p 405-411, September, 1972. 2 fig.

Descriptors: *River basin commissions, *Water management(Applied), Water resources, *Water utilization, Water supply, Water demand, Water conservation, Water quality, Rivers, Environmental control, Sewage disposal, Sewage treatment, Waste water treatment, Water pollution control.
Identifiers: *Regional water authorities(Gr. Britain), Central Advisory Water Committee(Gr. Britain).

River management and water services provision in Great Britain have developed in the last 100 years to probably the best standards in the world. Efficient water management is essential since exploitable water is scarce, resources are heavily used, rivers are small, and inland water exists in small proportions. Studies predict future needs to double present supplies. Rivers will be relied upon instead of just groundwater or water piped from upland storage. Water quality, equally as important as quantity, links waste removal and new source development into comprehensive management. In the past, water uses were separated, but the Trent Model Research Programme shows that by treating rivers as a system, an optimal solution, including water treatment, sewage disposal, and river management, is attained at lower cost than with separated functions. The Central Advisory Water Committee reported comprehensive water management should exist for each river basin, to be administered by multi-purpose authorities. Ten authorities will be established to provide water and reclaim or dispose of used water, considering navigation, recreation, drainage, defense, and conservation needs. A National Water Council is proposed to provide central water-related services. (Grden-North Carolina)
W74-05865

LAKE NORMAN DEVELOPMENTAL IMPACT STUDY,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
R. J. Burby, III, T. G. Donnelly, and S. F. Weiss.
Prepared for Centralina Council of Governments and Lake Norman Marine Commission, June, 1972. 121 p, 3 fig, 25 tab, 3 append.

Descriptors: *Lakes, *Recreation facilities, *Comprehensive planning, *Urbanization, Shore protection, Non-structural alternatives, Water pollution, *Land use, *North Carolina.
Identifiers: *Lake Norman(N.C.), Residential development, Participation rates.

Lake Norman in the Central Piedmont area of North Carolina has been a major recreational and residential resource since its creation in 1963. While present development is scattered, much of the shoreline has been committed to future intensive residential, commercial, and industrial use. The area will gradually shift from its presently rural environment to an increasingly urbanized one. Concomitant with this are the dangers of environmental degradation and the loss of recreational amenities. Problems of residential and resource utilization of the lake are analyzed. The amount and location of residential growth between 1970 and 1981 are forecast. The recreation environment is examined in terms of potential demand until 1981 and involves discussion of market area population, participation rates, and the relative accessibility of Lake Norman. An inventory and evaluation of existing recreational facilities and a projection of additional facilities needed by 1981, and identification of potential problems and conflict situations stemming from both residential and recreational uses are presented. Potential problems include water pollution, solid waste disposal, public access, residential quality, public safety, and conflicting water surface uses. Recommendations for policies and actions to maintain environmental quality and enhance recreational opportunities are: (1) develop a comprehensive land use plan; (2) preserve open space and land for public recreation; (3) promote compact development; (4) alleviate the threat of lake pollution; (5) improve the quality of development; (6) control litter and unauthorized dumping; (7) control vandalism and theft; and (8) control power transmission line routes. (Hoffman-North Carolina)
W74-05869

SHAWNEE COMPREHENSIVE PLAN, WATER WORKS SYSTEM AND SANITARY SEWERAGE SYSTEM,
Benham-Blair and Affiliates, Inc., Oklahoma City.
For primary bibliographic entry see Field 5D.
W74-05871

THE LAND WATER INTERFACE IN AN URBAN REGION: A SPATIAL AND TEMPORAL ANALYSIS OF THE NATURE AND SIGNIFICANCES OF CONFLICTS BETWEEN COASTAL USES,
Washington Univ., Seattle. Div. of Marine Resources.
P. Harrison.
Available from the National Technical Information Service as COM-73-11257; $5.25 in paper copy, $1.45 in microfiche. PhD Dissertation. 1973. 181 p, 20 tab, 8 fig, 157 ref. NOAA SG-1-72.

Descriptors: *Earth-water interfaces, Coasts, *Management, *Land use, *Urbanization, *Washington, Shores, Regional economics, Natural resources, Water utilization, Bodies of water, Environment, Model studies, Methodology.
Identifiers: *Puget Sound(Wash), *Coastal zone management, Sea Grant Program.

A framework for empirical analysis of changing coastline use in an urban area is provided. Growth of coastal activities is described, the role of common property resources in generating negative externalities is analyzed, and classifications developed are tested in the Puget Sound region of Washington. Coastal activities are divided into commercial and non-commercial sectors, and a shift to non-commercial activities in an advanced regional economy is hypothesized. Commercial activities produce a final demand good, and non-commercial activities are sites used by consumers, such as marinas. Twenty water-related activities are analyzed and result in support of the hypothesis. This shift is also relected in higher prices paid for shoreline location for non-commercial activities. The hypothesis that commercial activities generate competing coastal uses with negative effects felt by non-commercial activities is rejected, since non-commercial activities generate and receive a greater proportion of critical conflicts. Effects of land-use conflict upon regional political structure and spatial distribution of coastline activities are examined. For example, the shift to non-commercial activities, characterized by loosely coordinated groups, will probably result in more permanent groups to protect their interests. (Grden-North Carolina)
W74-05872

ENVIRONMENTAL QUALITY PLANNING - GOALS, POLICIES, AND OBJECTIVES.
East-West Gateway Coordinating Council, St. Louis, Mo.
Available from the National Technical Information Service as PB-222 097; $3.25 in paper copy, $1.45 in microfiche. Final Report. June, 1973. 18 p, 1 fig, 1 append. 3.8. Mo. P-198.

Descriptors: *Comprehensive planning, Environment, *Environmental effects, *Environmental control, Water policy, Water resources development, Land development, Land management, Land resources, Land use, Natural resources, *Missouri, Pollution, Air, Air environment, Air pollution, City planning.
Identifiers: *St. Louis(Missouri), *Environmental quality planning, Environmental goals, Environmental policies, Environmental objectives, Environmental protection.

Formation of environmental quality goals is the first phase of a comprehensive approach to environmental quality problems in the St. Louis, Missouri, region. Scope of environmental quality planning is delineated in the natural environment with systems of air, water, land, and plant and animal life which interact with each other and with man. Preliminary goals, policies, and objectives are established and are subject to continual refinement as programs progress. The general goal for environmental planning is a healthful, attractive, and ecologically sound environment which optimally supports the needs of citizens in the St. Louis region. Objectives include establishing a planning process, environmental enhancement and protection, and continuous evaluation. Water goals include regional water resources sufficient in quantity and quality to meet needs of the area and to support wildlife and to be used for human consumption. The goal for air resources is to reduce levels of air pollution in order to anticipate and prevent threats to human health and well-being. Development and use of land commensurate with the land's physical capabilities, and preservation of land in its natural state where possible, is the goal set for land use. (Grden-North Carolina)
W74-05876

A USEFUL THEOREM IN THE DYNAMIC PROGRAMMING SOLUTION OF SEQUENCING

AND SCHEDULING PROBLEMS OCCURRING IN CAPITAL EXPENDITURE PLANNING,
Northwestern Univ., Evanston, Ill. Dept. of Industrial Engineering and Management Sciences.
T. L. Morin, and A. M. O. Esogbue.
Water Resources Research, Vol 10, No 1, p 49-50, February 1974. 4 ref.

Descriptors: *Capital, *Expenditures, *Planning, *Theoretical analysis, Water resources, *Scheduling, *Dynamic programming, Optimization, Systems analysis, Mathematical models, Equations.

The management of capital expenditure planning continues to encounter problems that tempt the water resource planner to use complete enumeration, but the magnitude of such problems often defies the use of these direct methods. Direct transfer is neither feasible nor wise, and consequently, the establishment of a strong analytic base for this transfer is both necessary and useful. The dimensionality of certain sequencing and scheduling problems can be reduced by exploiting their special structures. An example of this type of reduction of dimensionality is presented in the form of a theorem. The use of the theorem in the dynamic programming solution of a previous example is discussed. Sufficient conditions for the optimality of a myopic decision rule are also shown to be a special case of the theorem. (Bell-Cornell)
W74-05935

MULTIPLE-OBJECTIVE OPTIMIZATION IN WATER RESOURCE SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 6A.
W74-05936

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

CONSERVATION OF WATER AND REDUCTION OF POLLUTION BY USE OF SOLVENT SYSTEMS FOR COLORING TEXTILE MATERIALS: AN ECONOMIC OUTLOOK,
Auburn Univ., Ala. Dept. of Textile Engineering.
For primary bibliographic entry see Field 3E.
W74-05535

ANALYSIS OF ECONOMIC IMPACTS OF ENVIRONMENTAL STANDARDS ON THE BAKERY INDUSTRY, PART I, EXECUTIVE SUMMARY.
Ernst and Ernst, Washington, D. C.
For primary bibliographic entry see Field 5G.
W74-05623

THE PROCEEDINGS OF A NATIONAL SYMPOSIUM ON COSTS OF WATER POLLUTION CONTROL.
North Carolina Research Triangle Universities, Raleigh; and Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05629

COST EFFECTIVENESS OF REGIONAL WASTEWATER SYSTEMS,
Environmental Protection Agency, Washington, D. C. Systems Application Section.
For primary bibliographic entry see Field 5D.
W74-05632

ECONOMIC GUIDELINES FOR ANALYSIS OF JOINT INDUSTRIAL-MUNICIPAL COLLECTION AND TREATMENT SYSTEMS,
Quirk, Lawler and Matusky Engineers, Tappan, N.Y.
For primary bibliographic entry see Field 5D.
W74-05634

EFFECTIVE POLLUTION CONTROL INVESTMENT,
Environmental Protection Agency, Washington, D.C. Div. of Municipal Waste Water Programs.
For primary bibliographic entry see Field 5D.
W74-05635

THE PRESENT AND FUTURE MARKET FOR POLLUTION CONTROL EQUIPMENT,
Business and Defense Services Administration, Washington, D.C. Water Resources and Engineering Services Div.; and Bureau of Domestic Commerce, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05636

ECONOMIC INCENTIVES IN WATER POLLUTION CONTROL,
Bowdoin Coll., Brunswick, Maine. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-05638

WATER AND WASTEWATER SURCHARGES AS ECONOMIC INCENTIVES,
North Carolina State Univ., Raleigh. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-05639

INDUSTRY VARIANCE OF CONSUMER PRICES AND COMPETITION AS A CONSEQUENCE OF WATER POLLUTION ABATEMENT,
Auburn Univ., Ala., School of Business.
For primary bibliographic entry see Field 5D.
W74-05640

COSTS OF WATER POLLUTION CONTROL IN THE CHEMICAL INDUSTRY,
Datagraphics, Inc., Pittsburgh, Pa.
For primary bibliographic entry see Field 5D.
W74-05642

COSTS OF WATER POLLUTION CONTROL IN THE PAPER INDUSTRY,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-05643

ECONOMIC GROWTH VS. ENVIRONMENTAL PROTECTION: WHAT WILL BE THE OUTCOME,
Wisconsin Univ., Madison. Dept. of Economics; and Wisconsin Univ., Madison. Dept. of Agricultural Economics.
J. Steinhart, R. Lampman, and W. Lord.
Proc available from the National Technical Information Service as COM-73-10115, $3.00 in paper copy, $1.45 in microfiche. In: Proceedings: Fourth National Sea Grant Conference, University of Wisconsin, Madison, Sea Grant Publ. WIS-S6-72-112, p 49-60, October 1971.

Descriptors: *Pollution abatement, *Economic efficiency, Environmental control, Market value, Social values, Regulation, Decision making, Governments, Costs, Benefits.
Identifiers: *Externalities, *Economic growth, Price system.

Economists differ from ecologists in terms of their ultimate goals and the means to achieve these goals. Economic growth is the goal of the economist, and includes production of both commodities and services. The benefits of growth can be directed towards the ecologist's goal of improving and preserving the environment. However, other claims, such as the elimination or reduction of poverty, the control of crime, and the elimination of discrimination, also exist for these same benefits. Economists use the price system yielding optimal amounts of pollution, in contrast to the policy of governmental regulation favored by ecologists. A major problem in utilizing the price system in this manner, however, is the effects of externalities. Externalities are third party effects which are not adequately measured in the market place. Thus a polluter does not feel the real cost of his actions. Public ownership and regulation, and assigning property rights to all aspects of the economy are suggested as ways of dealing with the issue. Future research ought to identify and evaluate externalities, and get them into the decision making process. Effluent charges, for example, would give the social cost of pollution and allow polluters to measure this cost against their benefits. (See also W74-05645 thru W74-05650) (Pinsky-Wisconsin)
W74-05644

ENERGY PRODUCTION AND ENVIRONMENTAL CONSEQUENCES,
Office of Science and Technology, Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05645

ECONOMICS OF AQUACULTURE DEVELOPMENT,
Hawaii Univ., Honolulu. Sea Grant Program.
J. R. Davison.
In: Proceedings of Fourth National Sea Grant Conference, October 12-13, 1971, Madison, Wisconsin, 1225 West Dayton Street, Sea Grant Program, University of Wisconsin, Madison, p 75-82. 3 ref.

Descriptors: *Aquiculture, *Economics, Evaluation, Agriculture, Feasibility studies, *Costs, *Profit, *Hawaii.
Identifiers: Sea Grant, Subsidies, Interdisciplinary cooperation, Aquiculture development.

There is sufficient promise of benefits derived from aquiculture to justify not only present investment, but a massive effort to develop it. The network of services, money subsidies, and cost-price controls which presently exist in agriculture, have not yet been established for entrepreneurs pioneering in aquiculture. While aid is now available from the Sea Grant Advisory Service in twelve states, there still is not the backlog of information or scientific manpower and skills that is available to agriculture. This deficiency has slowed the development of aquiculture. However, progress could be accelerated by the combination of available skills in terrestrial animal and plant science with those who already understand the aquatic life processes. Economists can contribute through the assessment of costs and returns, thus aiding the development of a viable, profit-making enterprise. Projects which inject economic input into ongoing studies of aquiculture are currently being conducted at the University of Hawaii. This type of cooperation is essential if aquiculture is to be raised to near its potential in several years rather than several generations. (See also W74-05644) (Pinsky-Wisconsin)
W74-05646

SOME REMARKS ON AQUACULTURE,
Hawaii Univ., Honolulu.
J. Bardach.
In: Proceedings of Fourth National Sea Grant Conference, October 12-13, 1971, Madison, Wisconsin, 1225 West Dayton Street, Sea Grant Program, University of Wisconson, Madison, p 83-88. 1 tab.

Descriptors: *Aquiculture, *Model studies, *Systems analysis, Research and development,

Oceans, Agriculture, Water pollution, Economic feasibility.
Identifiers: Sea Grant, Animal sciences, Joint programs.

While the green revolution will result in increased competition for aquaculture from animal protein, the growth in the world's population will severely strain the capability of land areas to nourish mankind. The extent to which ocean pollution can be curbed will very much determine whether the world's protein needs can be supplied in part through aquaculture. Aquaculture must become surface intensive, highly automated, and of a luxury kind in order to compete effectively with terrestrial animal protein. The phases which a species must go through before they can be put into competitive aquacultural production include: (1) species selection, (2) biological research, (3) field trials, and (4) assessment of socio-economic factors. Joint industry-government aquacultural research operations, as well as cooperative research by land animal scientists and aquatic biologists, would be useful. Such research should use system models in order to determine the true potential of aquaculture and the means of achieving that potential. (See also W74-05644) (Pinsky-Wisconsin)
W74-05647

LEGAL-ECONOMIC ASPECTS OF FISHERIES SESSION SUMMARY,
Louisiana State Univ., Baton Rouge. Law School.
For primary bibliographic entry see Field 6E.
W74-05649

SCAPE: A COMPUTER MODEL FOR ALTERNATIVE SEWER SYSTEM COST EVALUATION,
Southwestern Pennsylvania Regional Planning Commission, Pittsburgh.
For primary bibliographic entry see Field 5D.
W74-05873

PRELIMINARY FEASIBILITY STUDY FOR THE POJOAQUE VALLEY SEWERAGE SYSTEM.
Northern Area Planning Organization, Sante Fe., N. Mex.
For primary bibliographic entry see Field 5D.
W74-05875

WATER SUPPLY AND WATER POLLUTION CONTROL CAPITAL PROGRAM, 1972-1985.
Delaware Valley Regional Planning Commission, Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-05877

6D. Water Demand

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO: MIDDLE RIO GRANDE REGION,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W74-05408

75 WATER ASSESSMENT. DRAFT PLAN OF STUDY.
Water Resources Council, Washington, D. C.
For primary bibliographic entry see Field 6B.
W74-05626

LAND USE TRENDS AND THE FUTURE OF AGRICULTURE IN THE NORTH ATLANTIC REGION,
Massachusetts Univ., Amherst. Dept. of Landscape Architecture.
E. H. Zube.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 15, No 2, p 232-234, 238, March-April, 1972. 10 ref.

Descriptors: *Land use, Land management, Land development, Rural areas, Urbanization, Zoning, *Reviews, *Agriculture, *Projections.
Identifiers: *Open land.

A literature review study shows that agricultural and 'open' land will decrease by as much as 50% by the year 2020 if present trends continue. An argument for land conservation and retention is also presented. (Skogerboe-Colorado State)
W74-05682

PUBLIC WATER SUPPLIES OF NORTH CAROLINA: PART I. NORTHERN PIEDMONT,
Geological Survey, Raleigh, N.C.
N. M. Jackson, Jr.
North Carolina Office of Water and Air Resources, raleigh, July 1972. 277 p, 4 fig, 5 ref.

Descriptors: *Water supply, *North Carolina, *Hydrologic data, *Data collections, Water utilization, Water quality, Municipal water, Industrial water, Domestic water, Water resources development.

Information on the water resources and inventories of the public water supplies is compiled for 18 counties in the northern Piedmont section of North Carolina. The information should be useful to planners and water managers concerned with water-supply availability, water-resources development, and water quality. The method of investigation, the information reported for each water supply and its significance to planning, chemical analyses included in the report, and some of the problems noted during the investigation are discussed. A water-resources appraisal and a map of each county show the general area served by public water supplies and an inventory of each public supply in the county with 500 or more customers. The appraisal includes the population served, the adjacent communities served, the number of metered customers, the source of water, estimated allowable draft, total and industrial water use, raw and finished water storage, raw and finished water-pumping capacity, future plans, a water-resources appraisal in the immediate vicinity of the supply, and the results of chemical analyses of raw and finished water. (Knapp-USGS)
W74-05858

WATER SUPPLY PROBLEMS AND FUTURE RESOURCES,
Water Resources Board, London (England). Research Div.
P. G. O'Neill.
Town and Country Planning, Vol 40, No 9, p 412-418, September, 1972. 1 photo.

Descriptors: *Water sources, *Water utilization, *Water management(Applied), Water resources, Water demand, Water conservation, Water delivery, Water quality, Water requirements, Surface water availability, Groundwater, Reservoirs, Desalination, Estuaries, Water treatment, *Water reuse, *Waste water treatment.
Identifiers: *Metropolitan Water Board(Gr. Britain), London(England).

A shift from construction to management of water resources, plus a corresponding emphasis on water and effluent treatment rather than provision of additional water sources, is occurring in Britain. Traditionally, water supplies were derived from boreholes in aquifers, but groundwater levels fell for 150 years before the process was arrested. River water was used, but pollution necessitated development of reservoirs in upland valleys. Most reservoirs are of the direct-supply type, yet increased demand for water has led to treatment of water for reuse. Study concerning guidelines for operating sluices to maintain water flow but to provide maximum storage is progressing. The use of radar is feasible to predict rainfall affecting water supply. Other considerations in reservoir regulation include use of gravity or pumped inflows and ecological consequences of management. Another source, groundwater, usually biologically pure, could help maintain river flows in dry years, and artificial recharge of aquifers from river water could be undertaken. Estuarial storage schemes are also proposed, as is desalination of sea water. Due to complexity and cost of the process, desalination could be justified only if no future surface or groundwater source development was possible. (Grden-North Carolina)
W74-05864

WATER AND SEWER NEEDS OF LOW INCOME FAMILIES FOR THE MID-CUMBERLAND REGION OF TENNESSEE.
Mid-Cumberland Council of Government, Nashville, Tenn.
For primary bibliographic entry see Field 5D.
W74-05870

DEMANDS ON NATIONAL FORESTS REQUIRE COORDINATED PLANNING,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W74-05926

INTERREGIONAL PLANNING OF WATER RESOURCES ALLOCATIONS BY SYSTEMS ANALYSIS APPROACH,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 4A.
W74-05932

6E. Water Law and Institutions

WATER POLLUTION CONTROL IN ALASKA,
For primary bibliographic entry see Field 5G.
W74-05465

NEW DIRECTIONS IN U.S. WATER POLICY--SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FROM THE FINAL REPORT OF THE NATIONAL WATER COMMISSION.
National Water Commission, Arlington, Va.
For primary bibliographic entry see Field 6B.
W74-05522

PART 124--STATE PROGRAM ELEMENTS NECESSARY FOR PARTICIPATION IN THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
For primary bibliographic entry see Field 5G.
W74-05573

PROTECTION OF PUBLIC WATER SUPPLY.
Pa. Stat. Ann., secs. 691.1 thru 691.8 (1970).

Descriptors: *Pennsylvania, *Administrative agencies, *Water pollution sources, *Industrial wastes, Sewage effluents, Project planning, Permits, Regulation, Legislation, Water conservation, State governments, Recreation, Economic aspects, Aesthetics, Watershed management, Water supply, Waste water treatment, Water resources development, Conservation, Water utilization, Water quality, Public health, Environmental engineering.
Identifiers: *Administrative regulations, *Nuisance(Legal aspects).

It is a public nuisance to discharge sewage, industrial waste, or any substance into Pennsylvania waters which contributes to or causes pollution.

Unpolluted streams in the state are essential in the attraction of new industries, and in the development of the tourist industry. Clean water is also necessary to meet the demand for increased outdoor recreational facilities. In other words the prevention and elimination of water pollution is directly tied to the state's economic future. A comprehensive program of watershed management and control is needed. The Pennsylvania Sanitary Water Board is authorized to adopt regulations and to issue orders or permits to implement the statutory objectives. The Board should consider water quality management and pollution control in the watershed, present and possible future uses of particular waters, feasibility of combined or joint treatment facilities, the state of scientific and technical knowledge, and the immediate and long range economic effects. They are also responsible for the development and implementation of water supply and waste management plans. All fines, civil penalties, application fees, and permit fees will go into the Clean Water Fund to be used by the Board for the elimination of pollution. (Sperling-Florida)
W74-05574

RESERVOIRS AND WATER RESOURCES.
Pa. Stat. Ann., sec. 1999C (1965).

Descriptors: *Pennsylvania, *Administrative agencies, *Dams, *Reservoirs, *Water resources development, Administration, Legislation, Adoption of practices, Cities, State governments, Regulation, Water sources, Permits, Withdrawal, Water wells, Water supply, Water costs, Use rates, Project planning, Water utilization, Water distribution(Applied).
Identifiers: *Administrative regulations.

The board of commissioners of any county may obtain funds to expend on the acquisition, construction, operation, and maintenance of dams, reservoirs, and wells. The purpose of these structures is the utilization of surface, subsurface and ground water resources. Sites for these structures may also be acquired through the power of eminent domain. This board must obtain a permit from the Pennsylvania Department of Environmental Resources when such a permit is required. The board may enter into agreements for the regulation and sale of withdrawals and diversions of waters from the facilities with the approval of the state or federal agency with jurisdiction over the water resource. Facilities obtained by the board may be for any purpose except the generation of electric energy. The board is authorized to enter into contracts or agreements with any state or federal agency for the development and use of the county's water resources. It will also be lawful for any county to execute such agreements and contracts to provide for the utilization of water resources. Any county may also contract for the sale of water to any other county, town or public utility at reasonable, uniform rates. (Sperling-Florida)
W74-05575

EXPLORATION, PRODUCTION, OR TRANSPORTATION OF OIL OR GAS IN NAVIGABLE WATERS.
Miss. Code Ann., secs. 53-3-71 through 53-3-75 (1972).

Descriptors: *Mississippi, *Legislation, *Oil industry, *Navigable water, *Navigation, Transportation, Exploration, Structures, Construction, Permits, Public rights, Oil, Natural gas, Beds, Tidal waters, State jurisdiction, Legal aspects.

Any person, firm or corporation duly authorized to engage in the exploration, production or transportation of oil, gas or other minerals under Mississippi law, shall have the right to construct, operate and maintain facilities incident to such operations in any of the state's navigable waters. To do so, a permit for the construction, operation and maintenance must be obtained from the Mississippi oil and gas board, upon payment of five hundred dollars. The operation of any such facility which is on, under or across submerged land or which is located where the tide may ebb and flow is subject to the paramount right of the United States to control commerce and navigation, the right of the public to make free use of the waters and also any restrictions or prohibitions contained in the Mississippi Constitution. (Ritchie-Florida)
W74-05576

SIERRA CLUB V. LYNN (ACTION CHALLENGING EIS WHICH FOUND COMMUNITY PROJECT WOULD NOT POLLUTE WATER RESERVOIR).
364 F.Supp. 834-852 (W.D. Tex. 1973).

Descriptors: *Water pollution effects, *Water pollution sources, *Water policy, *Water resources, Judicial decisions, Natural resources, Underground structures, Erection, Buildings, Legislation, Legal aspects, Water law, Water resources development, Federal government, *Texas, Jurisdiction, Land use, Land management, Environmental effects, Alternative planning.
Identifiers: *National Environmental Policy Act, Environmental Impact Statements.

Plaintiffs filed suit against the Department of Housing and Urban Development (HUD), alleging that the development of a new community housing program would violate the National Environmental Policy Act (NEPA). Development is to be staggered over the next 30 years and the proposed site is in virtually an undisturbed natural condition. The court carried out an in-depth review of the Secretary's decision, but stated it could overrule the decision, under the Administrative Procedure Act (APA), only upon a showing of an arbitrary and capricious abuse of discretion. The opinion extensively discussed the applicability of the Urban Growth and New Community Development Act. The court not only felt the Secretary's decisions were sound, but that the project and its land-use controls were an extremely vital vehicle for capturing and controlling growth in a very sensitive geographical area. The opinion discussed the applicability of NEPA to the project and found the EIS sufficient, in that the Secretary had not violated the APA. In discussing the applicability of the Water Pollution Act, the court felt Congress could not improve upon the HUD standards for the protection of the aquifer in question. After the extensive review, the court held the new community should not be hindered as long as HUD imposed controls are maintained and to insure this, the court retained jurisdiction. (Sutton-Florida)
W74-05577

FLOOD PROBLEMS IN CERTAIN AREAS OF THE HACKENSACK RIVER BASIN; SADDLE RIVER BASIN; PASSAIC RIVER BASIN; AND POMPTON RIVER BASIN--STATE OF NEW JERSEY.
Hearing--Before the Subcommittee on Investigations and Review of the Committee on Public Works, U.S. House of Representatives, 93rd Cong., 1st Sess., February 23, 1973. 162p, 18 photo, 3 map.

Descriptors: *New Jersey, *Federal government, *Financing, *Local governments, *River basin development, *Flood protection, Budgeting, Land management, Watershed management, Streambeds, Flooding, Flood plain zoning, Engineering structures, Backwater, Government finance, Cost sharing, Project planning.
Identifiers: *Congressional hearings.

There is a long history of flooding problems in New Jersey. Land development takes place along the upper reaches of streams and encroachment occurs on the flood plain of the lower reaches until, in many cases, the problem reaches disaster proportions. Improvements in bridges and culverts and major channel improvements can alleviate this to some extent. Officers and interested parties from each municipality presented their localized flood problems to the committee. Many of the needed improvements are too expensive for each city or town to solve completely, so these hearings serve to bring the problems to the attention of those in the federal government who can secure federal funds for the project. (Sperling-Florida)
W74-05584

THE COLUMBIA RIVER TREATRY: THE ECONOMICS OF AN INTERNATIONAL RIVER BASIN DEVELOPMENT,
Resources for the Future, Inc., Washington, D.C.
J. V. Krutilla.
John Hopkins Press, Baltimore, Maryland, 1967. 211 p, 26 fig, 34 tab, 178 ref. Price: $7.50.

Descriptors: *River basin development, *Federal project policy, *Columbia River, *Cost-benefit analysis, Federal government, Legislation, Treaties, Internationl waters, Cost comparisons, Economics, Comparitive costs, Columbia River Basin, Water resources development, Watershed management.

The study attempts to establish whether certain assumptions underlying a co-operative undertaking to develop an international river for mutual benefit of the participating countries are in fact borne out by the resulting terms of such agreement. Contained is a generalized and theoretical discussion of the problems and objectives of international river development. The Columbia Treaty is then analyzed in light of the criteria developed and although the focus is on economic considerations, social and political factors are also considered. The conclusion is that while certain results were desired, they were obtained by means that were not consistent with the fundamental objective of co-operative resources development--the achievement of shared economics. (Sutton-Florida)
W74-05585

NEPA IN THE COURTS: A LEGAL ANALYSIS OF THE NATIONAL ENVIRONMENTAL POLICY ACT,
Environmental Law Inst., Washington, D.C.
F. R. Anderson, and R. H. Daniels.
Johns Hopkins University Press, Baltimore, 1973. 324 p, 1126 ref, 3 append.

Descriptors: *Water resources development, *Federal project policy, *Environment, *Environmental effects, *Evaluation, Federal government, Judicial decisions, Legal aspects, Decision ration, Project purposes, Legislation, Environmental Engineering, Social aspects, Third party effects.
Identifiers: *Environmental impact statement, *National Environmental Policy Act.

The real heart of the National Environmental Policy Act (NEPA) is section 102 (2) (C) which requires all federal agencies to prepare a detailed statement on all actions significantly affecting the quality of human environment. Because the guidelines laid down by the government to implement this provision have proved insufficient, the legal points involved have been raised by private citizens in challenges to government actions, and this has given courts a major role in shaping the meaning of NEPA's 'action forcing' provision. Analysis are presented of the state of the law with respect to all major issues which have been raised in suits under 102 (2) (C). (Sutton-Florida)
W74-05586

WATER RESOURCES DEVELOPMENTS AND NAVIGATIONAL IMPROVEMENTS IN ALASKA.
Hearings--Before the Subcommittee on Water Resources of the Committee on Public Works,

U.S. Senate, 93d Cong., 1st Sess., August 1973. 537 p.

Descriptors: *Alaska, *Federal government, *Water resources development, *Harbors, Oil industry, Commercial fish, Navigation, Political aspects, Social aspects, Boating, Sport fishing, Aesthetics, Recreational facilities, Beach erosion, Engineering structures, Bridges, State governments, Funding, Project planning, Cost-benefit analysis, Feasibility studies, Cost sharing, Breakwaters, Coastal engineering.
Identifiers: *Congressional hearings.

Alaska is behind in the development of small boat harbor facilities, but is relatively advanced as to medium and deep water facilities. The need for federal funding is great if any meaningful improvement is to be accomplished. Very few of the projects necessary would qualify as a corps project because of their marginal benefit-to-cost ratios. Most of the small boat harbors in Alaska are for commercial fisheries and pleasure craft. Much of the testimony concerns itself with specific projected projects and their benefits and costs. (Sperling-Florida)
W74-05587

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974 PART 6.
Hearings--Subcomm. of the Committee on Appropriations--United States House of Representatives 93d Cong., 1st Sess., May 14, 1973. 1265p.

Descriptors: *Federal government, *Water resources development, *Water policy, *Government finance, *Flood protection, Watershed management, Legislation, Administration, Planning, Political aspects, Flood control, Budgeting, Economic efficiency, Participating funds, Priorities.

The hearings were conducted for the purpose of gathering information and testimony regarding the allocation of funds in the 1974 Appropriation Bill for water resources programs. Both opposition and support testimony were given by members of Congress and other individuals and organizations. Much emphasis was placed on the losses and devastation caused by the flooding of the Mississippi River. Included in the testimony are reports of damage caused by flooding, charts and reports of current projects and expenditures, and reports of various studies which have been conducted. There are also many statements, letters, and commentaries by various interested individuals and action groups. (Conko-Florida)
W74-05588

DELAWARE RIVER BASIN COMMISSION: ANNUAL REPORT 1973.
Delaware River Basin Commission, Trenton, N.J. 1974. 24 p, 2 map, 29 photo, 3 chart.

Descriptors: *Delaware River, *Interstate commissions, *Interstate compacts, *Water policy, *Water resources development, State governments, Administrative agencies, Cooperation, Coordination, Planning, Water utilization, Water demand, Water control, Structures, Dams, Reservoirs, Canals, Flood control, Flood prevention, Flood protection, Environment, Environmental protection, Pollution control, Water management, Water development, Recreation, Project-purposes, Industry, Agriculture, Municipalities.

Accomplishments and problems encountered and impending in the Delaware River Basin in 1973 are reviewed. Water control projects in the nature of dams and reservoirs have been constructed and more are in the development stages. Recreational use continues to be abundant despite the damage incurred in the upper portion of the river due to the heavy flooding in June of 1973. Flood damage canals constructed to run parallel with the river at certain vulnerable points absorbed a maximum of stress but severe battering occurred to several municipalities despite the presence of such structures. Flood plain controls have reached their first stage completion point with a comprehensive research plan depicting and documenting the flood history of many vulnerable areas along the basin. Various environmental safeguard measures have also been implemented ranging from the creation of an Environmental Unit to coordinate various environmental problems and interstate programs to review the needs and demands of the many water-using operations of industry, agriculture and government along the basin. Water sales and water power capacity and services are also described. (Silber-Florida)
W74-05589

LEGISLATIVE FRAMEWORK FOR WATER RESOURCES MANAGEMENT IN ALABAMA.
Alabama Univ., University. Natural Resources Center.
Available from the National Technical Information Service as PB-224 322 $4.75 in paper copy, $1.45 in microfiche. Prepared for Alabama Development Office, Montgomery, March, 1973. 45 p, 66 ref.

Descriptors: *Alabama, *Water law, *Water resources development, *Comprehensive planning, *Conservation, Long term planning governments, Administrative agencies, Water utilization, Industries, Municipalities, Water allocation, Water distribution, Water demand, Legal aspects, Standards, Regulation, Water control, Water supply, Water quality, Water quality control, Coordination, Cooperation, Legislation.

The necessity of water resource planning for the future is emphasized even though Alabama's present water supply is abundant. Present judicial doctrines narrowly view the regulation of water usage as necessary only when controversy arises, and then on only a case to case basis. Present legal preferences avoid determining the most beneficial community use of water, and planning up until now has received little if any attention. Water must be recognized as a dwindling commodity to be paid for by the industries and municipalities that use and pollute it. Inherent in a long-term planning scheme already operative in many humid eastern states is a system of water allocation and distribution based on development and planning goals. Also essential is the single agency concept, giving one main, statewide agency authority to integrate all planned projects into a state masterplan for water resource development. A review and evaluation are included of existing water resources and planning statutes among the several states, as well as specific constitutional problems which might arise and proposed legislation. (Silber-Florida)
W74-05590

A BILL AUTHORIZING THE CONSTRUCTION, REPAIR, AND PRESERVATION OF CERTAIN PUBLIC WORKS ON RIVERS AND HARBORS FOR NAVIGATION, FLOOD CONTROL, AND FOR OTHER PURPOSES.
House Bill 10203, 93d Cong, 1st sess (1973), 144p.

Descriptors: *Federal government, *Legislation, *Water resources development, *Project purposes, *Water policy, Navigation, Navigable waters, Structures, Facilities, Planning, Flood protection, Flood prevention, Administrative agencies, Power plants, Hydro-electric power, Water management, Water quality, Water quality control, Land use, Land development, Land management, Easements, Ecology, Environment, Environmental effects, Fishlife, Wildlife conservation, Regulations, Wildlife management, Standards, Channels, Pollutants, Disposal, Shores, Shorelines, Banks.

This Bill entitled Water Resources Development Act authorizes the Army Corps of Engineers to design and implement multiple-purpose water resource development projects. The Corps has the duty and resonsibility of constructing, repairing and preserving various public works on rivers and harbors for navigation, flood control and other purposes. The Bill provides for hurricane flood protection and other flood prevention appropriations on a regional basis. Also included are guidelines for hydro-electric power installation sites. In the development of the several projects provided for in the Act, the Corps shall assure that proper provisions are made for fish and wildlife management, including acquisition of necessary lands or environmental easements. Such easements shall prevent the clearing of the subject land for commercial agricultural purposes or any other purposes inconsistent with wildlife habitat. Also among the provisions are directions to the Corps to remove certain sunken vessels which impede navigation and authorization to clear channels of such trees, roots and debris and other objects which impair safe navigation. The Corps is authorized to operate and maintain models to test proposals affecting the environmental quality of the regions, including sanitary intrusion, dispersion of pollutants, water quality, shoreline changes and others. (Silber-Florida)
W74-05592

LIFE OF THE LAND V. BRINEGAR (ACTION TO ENJOIN SEAWARD RUNWAY FOR AIRPORT).
485 F. 2d 460-474 (9th Cir. 1973).

Descriptors: *Federal project policy, *Project planning, *Environmental effects, *Wildlife habitats, *Project purposes, Federal government, Inter-agency cooperation, Judicial decisions, Legal aspects, Administrative decisions, Cost sharing, Legislation, Hawaii, Ecology, Pollutants.
Identifiers: *National Environmental Policy Act(NEPA), Environmental Impact Statements.

After consideration of the record, the court held the necessary environmental impact statement (EIS) had complied with the requirements of the National Environmental Policy Act (NEPA) and also comported with the Airport and Airway Development Act as no feasible alternatives were shown. The court stated that compliance with NEPA relating to the EIS is based on good-faith objectivity rather than subjective impartiality. Plaintiffs urged consideration of measures to protect a rare water bird felt to be endangered by the proposed project, and an alleged failure to comport with the NEPA requirement of alternative proposals. The court found nothing in the record which indicated the project's planners believed that the project would have an irreparably deleterious effect upon the environment, but found various environmental side benefits, such as the reduction of air and water pollution, enhancement of recreational boating facilities and improvement in area fishing. With respect to alternative proposals, the court held there was no need to consider alternatives, the effect of which cannot be reasonably ascertained and where implementation is deemed remote and speculative. The EIS need only set forth those sufficient to permit a reasoned choice. As there was substantial evidence and no arbitrary or capricious action taken, the circuit court affirmed for the defendants. (Sutton-Florida)
W74-05593

WASTE DISPOSAL.
N.Y. Environmental Conservation Law, sec. 27-0301 (1972).

Descriptors: *Waste water(Pollution), *Water quality, *Water pollution control, *Waste disposal, Waste water disposal, *New York, Sewage disposal, Septic tanks, Sanitary engineering, Natural resources, Water sources, Legisla-

tion, Administration, Water pollution effects, Permits.

The statute deals with private waste disposal and the registration of septic tank cleaners and industrial waste scavengers. No person shall engage in removing or disposing of solid or liquid wastes from domestic sewer systems and treatment facilities or from waste-producing operations of factories or commercial establishments without first obtaining a certificate of registration. This certificate will be issue the Commissioner of Environmental Conservation, and the procedure for obtaining the certificate is set forth. If the Commissioner determines that the applicant's nature and operation of business will be detrimental to the natural resources or environment of the state, he may refuse issuance or impose conditions so as to adequately protect against unreasonable degradation of those resources. The registration certificate requires an annual report to the Commissioner indicating the number and type of installations emptied or cleaned, the volume and nature of wastes disposed and the place and manner in which they were finally disposed. The registration shall be renewed annually, and the Commissioner may suspend or revoke any certificate upon proof that the registrant has been found guilty of violating any of the provisions of the statute. (Sutton-Florida)
W74-05594

WATER POLLUTION--WASTE DISPOSAL.
N.Y. Environmental Conservation Law, sec. 17-0701, (1972).

Descriptors: *Water pollution, *Water quality, *Water pollution control, *Waste disposal, *Waste water disposal, *New York, Sanitary engineering, Legislation, Administration, Water sources, Water pollution effects, Nuclear powerplants, Hydroelectric plants, Electric power, Ultimate disposal.
Identifiers: *Deep well disposal system.

This statute deals with water pollution control and the permits needed for operation of a disposal system, or the opening of a new sewage outlet. Virtually all types of waste are covered. A project plan for the proposed operation must be submitted to, and approved by, the Commissioner of Environmental Conservation before a permit will be issued. Steam-electric generating facilities and nuclear plants are specifically mentioned. An exception is given to a disposal system which discharges sewage effluent without the admixture of industrial wastes or other wastes from a private dwelling of less than three families and the discharge consists of a flow of less then one thousand gallons a day. Counties, cities, and towns are able to adopt and enforce additional local laws provided that they are not inconsistent with the provisions of this statute or the sanitary code. The commissioner may delegate his duties subject to such conditions as he may establish. Public hearings are provided for in connection with the construction, operation, alteration or extension of a deep well disposal system in the locale in which it will operate and notice requirements are set forth. Public hearings will also be required upon denial, revocation or modification of an issued permit. (Sutton-Florida)
W74-05595

WATER POLLUTION CONTROL POWERS.
N.Y. Environmental Conservation Law, secs. 15-0313 through 15-0315 (1972).

Descriptors: *Water pollution, *Water pollution control, *Water quality control, *Water resources, *Water conservation, *New York, Legislation, Interagency cooperation, Cost allocation, Administration, Water policy, Water pollution sources, Water resources development, Water quality, Environmental conservation, Comprehensive planning.
Identifiers: Administrative regulations.

This statute deals with the New York department of water resources and the powers and responsibilities of that department with respect to water pollution control. The department is authorized to classify state waters in accordance with the best usage in the public interest theory and to alter, modify or amend water quality and purity standards for the control of pollution in those waters. The department is further authorized to adopt and enforce regulations governing the use of chemicals in water for the control and elimination of aquatic vegetation, for the control of undesirable fish or for the control of aquatic insects, subject to certain provisions set forth. Cooperation between the department and other governmental bodies is in order to adequately protect the interests of the state in its water resources. The department shall be the agent of the state to obtain the aid and assistance of appropriate federal agencies and may enter into contracts when required. Such contracts, containing cost allocations, may be made by the department, provided that payment by the state shall not exceed one-half the cost, including personal service, of the service rendered by the federal agencies. (Sutton-Florida)
W74-05596

PROTECTION OF WATER.
New York Environmental Conservation Law, secs. 15-0501 thru 15-0515.

Descriptors: *New York, *Legislation, *Permits, *Water law, *Water protection, Water policy, Structures, Impoundments, Dams, Dikes, Legal aspects, Administrative agencies, Alteration of flow, Diversion, Obstruction of flow, Erosion, Pollution control, Flood prevention, Flood protection, Natural resources, Ecology, Environment, Resources development, Water resources, Water utilization, Navigable waters, Water demand, Water sources.

No person or public corporation shall change, modify or disturb the course, channel or bed of any stream or remove any sand, gravel or other materials without a permit. Before issuing a permit for any of the above activities the New York Department of Environmental Conservation shall determine the effect that such will have on soil erosion, increased turbidity of the waters, irregular variations in the velocity, temperature and level of the waters and also the resultant loss of fish and aquatic wildlife and the dangers of flooding and pollution. The Department shall also consider the relative effect that such activities will have on the natural resources of the state and the general health, safety and welfare of the people of the state. Permits shall be issued only when the Department has made certain that such projects will afford proper protection to the beneficial public uses of such water courses. Provisions of this enactment shall not affect the navigable waters of the state. Construction of dams, impoundment structures, docks and piers shall also be made only be permit pursuant to the directions of this statute. (Silber-Florida)
W74-05598

ALTERATIONS IN WATERCOURSES AND LAKES.
New York Environmental Conservation Law, sec. 15-0701, (1972).

Descriptors: *New York, *Legislation, *Water law, *Water policy, *Water control, Legal aspects, Riparian rights, Prescriptive rights, State governments, Water resources, Water resources development, Water demand, Water allocation, Water distribution, Water levels, Water supply, Water utilization, Lakes, Streams, Flow, Alteration of flow, Diversion, Obstruction of flow, Structures, Reasonable use.

Private riparian land-owners may alter the natural flow, quantity, quality or condition of a natural water-course or lake either on or below the surface of the earth. Withdrawal, impoundment or obstructions of the water in such watercourse or lake or addition of water thereto or changes in the banks, beds, course or other physical characteristics of such watercourses or lakes is permissible if reasonable, as long as it is not immediately injurious to neighboring riparian or non-riparian owners at the time of commencement of such alterations. No action for injunction or for nominal damages shall be maintainable unless such alterations are causing plaintiff harm, or would cause immediate harm if and when begun. 'Harm' shall mean interference with a present use of the water by the complaining party, a decrease in the market value of his interest in riparian land, or interference with his present enjoyment of such riparian lands. (Silber-Florida)
W74-05599

INTERFERENCE WITH FISH AND WILDLIFE IN STREAMS AND RIVERS.
New York Environmental Conservation Law, secs. 11-0505 thru 11-0507 (1972).

Descriptors: *New York, *Legislation, *Water law, *Wildlife management, *Wildlife conservation, Ecology, Conservation, Natural resources, Resource development, Fish management, Administrative agencies, Structures, Habitats, Habitat improvement, Environment, Streams, Stream flow, Regulation, Water policy, Game management.
Identifiers: Administrative regulations.

Except as permitted by the New York Department of Fish and Wildlife, no person shall obstruct the passage of fish in any stream or river by a screen or any other means. The Department may order the removal of any existing obstruction. Additionally, no person shall hold back or divert water in any stream which supplies a hatchery or take fish from any hatchery waters, without the Department's permission. No deer or bear traps shall be made, nor shall any person use any device which prevents frogs from having free access and egress from water. Except as permitted by the Department, no person shall at any time disturb a beaver dam, house or den or a muskrat house or den or any structure constructed by a muskrat in which it can take shelter. No person may wilfully liberate within the state any wildlife except under permit from the Department. (Silber-Florida)
W74-05600

POLLUTING STREAMS.
New York Environmental Conservation Law, sec. 11-0503 (1972).

Descriptors: *New York, *Legislation, *Water law, *Streams, *Pollution control, Wastes, Waste disposal, Sewage, Sewage disposal, Water quality control, Water quality, Water purification, Water resources, Fish life, Wildlife, Water management, Water development, Water policy, Pollution abatement, Pollution sources, Conservation, Natural resources, Solid wastes, Solid waste disposal, Sludge, Industrial wastes, Agricultural wastes.
Identifiers: Hazardous substances(Pollution).

It is unlawful for dyestuffs, coal tar, refuse from gas houses, cheese factories, creameries, condensaries, or canning factories, sawdust, shavings, tan bark, lime, acid, oil or other deleterious or poisonous substance to be thrown or allowed to run into any public or private waters, in quantities injurious to fish life, protected wildlife or waterfowl or their propagation. Nor shall any person place sewage or any like substances in any place where it can find its way into any of the above waters. Oil, acid, sludge or wastes from vessels shall not be dumped or released into the waters of the Hudson or Mohawk Rivers. No earth, soil, refuse or other solid substances except snow or ice, shall be disposed of in any stream or tributary which is inhabited by trout, or upon the

banks of any such waters. Dumps and disposal areas for refuse along the banks of trout streams, shall be operated in such a manner that the solid substances deposited thereon shall not enter the stream at any stage of water level. (Silber-Florida)
W74-05601

DEPARTMENT OF ENVIRONMENTAL CONSERVATION.
N.Y. Environmental Conservation Law, secs. 3-0301 thru 3-0303 (1972).

Descriptors: *Water resources development, *Environment, *Conservation, *Water policy, *New York, Pollution abatement, Water resources, Administration, Inter-agency cooperation, Water demand, Water supply, Water law, Legislation, Adoption of practices, Coordination, Natural resources planning, Financing.

General functions, powers, duties and jurisdiction of New York's Department of Environmental Conservation are described. The Commissioner of the department shall have the power to carry out the state's environmental policy, and those powers, set forth, are varied and extensive. To further carry out state environmental policy, the department is authorized to execute contracts, change environmental standards and criteria, engage in consultations, and undertake studies. A statewide environmental plan for the management and protection of environmental quality and natural resources is provided for, and in formulating this plan, the department shall conduct public hearings, cooperate with other departmental agencies and individuals, and request and receive such assistance and data as may be necessary to enable the department to carry out its responsibilities under the statute. When funds are available, the commissioner may acquire any real property necessary for any of the purposes or functions of the department by purchase or appropriation. Title to such property shall be taken in the name of and vested in the state. (Sutton-Florida)
W74-05602

FISHWAYS AT DAMS OR OBSTRUCTIONS.
N. H. Rev. Stat. Ann., ch. 211:8 to ch. 211:8C (Supp 1972).

Descriptors: *Fish, *Fish barriers, *Fish passages, *Dams, *New Hampshire, Fish guiding, Fish management, Legislation, Administration, Ecology, Fish conservation, Water policy, Water law, Legal aspects, Structures, Impounded waters.

Fish passage facilities are to be constructed and maintained at existing dams in accordance with a six point procedural plan, which shall be under the auspices of the director of the fish and game department. Public hearings, the sharing of construction costs, designs and locations of the passageways, the operation of the passageways, and appeal procedures are set forth in the plan. Lawful inspections by the director or his representative are authorized and the procedural plan shall not apply to those dams under license by the Federal Power Commission. (Sutton-Florida)
W74-05603

INTERSTATE MINING COMPACT.
N.C. Gen. Stat., secs. 74-37 thru 74-38 (1967).

Descriptors: *North Carolina, *Mine drainage, *Water pollution sources, *Mine wastes, *Coordination, *Land management, *Interstate compacts, Decision making, Social aspects, Legal aspects, Public health, Safety, Reclamation, State governments, Legislation, Administration, Administrative agencies, Water conservation, Recreation, Wildlife habitat, Waste water(Pollution), Water resources, Water quality, Aesthetics.
Identifiers: Administrative regulations.

The effects of mining on the availability of land, water and other resources present many problems which can be approached only with due consideration of both public and private rights. This interstate compact is aimed at the protection and restoration of land, water, and other resources affected by mining. It is also aimed at the reduction and elimination of water pollution attributable to mining. Each party state will formulate and establish an effective program for the conservation and use of mined land. The program will seek to accomplish the following: the protection of the public; the protection of landowners from damage to their land and structures on the land; and the safe handling of mine wastes to reduce effects on the aesthetic value and utility of land and water. The Interstate Mining Commission has power to study mining operations to gain knowledge on the effects of such operations on soil, water, animal life, recreation, and community development. The Commission can also make recommendations as to aspects of law within the purview of this compact. The Commission will be made up of the governor of each state. The governor shall have the assistance of an advisory body and the statute establishes this committee to be called the 'mining council.' (Sperling-Florida)
W74-05604

NORTH CAROLINA WATER SAFETY COMMITTEE.
N.C. Gen. Stat., secs. 75A-20 thru 75A-26 (1969).

Descriptors: *North Carolina, *Recreation, *Safety, *Administrative agencies, State governments, Legislation, Coordination, Adoption of practices, Project planning, Water demand, Recreation demand, Social aspects, Water policy, Administration, Education, Research, Political aspects, Local governments, Budgeting, Operating costs.

This statute establishes the North Carolina Water Safety Committee to act as an advisory body to public and private agencies and interests in regard to the maintenance of a water safety program. Members on the Committee will be appointed by the Governor for three year terms. Local authorities may sponsor local safety committees to consult for the needs and desires of the public in matters of water recreation and safety. Members of this committee will receive no remuneration except travel and subsistence allowances. The members are under an obligation to keep themselves informed on problems of water recreation and safety in their area. They are to study these problems and also those that may be referred to them by their sponsor or by the chairman of the North Carolina Water Safety Committee. They are to make reports either on their own motion or in response to a request for a study on these problems, with suggestions for remedies where feasible. These reports may be made to the sponsor, the State committee, or any public or private person or agency with the power to effect improvements in the level of water recreation safety to the public. The committees may also coordinate programs of public education in the field of water safety. (Sperling-Florida)
W74-05605

PUBLIC WATER SUPPLY SYSTEMS.
N.C. Gen. Stat., sec. 130-161.1 (1971).

Descriptors: *North Carolina, *Public health, *Administration, *Water resources development, Water demand, Water distribution(Applied), Water resources, Water storage, Water supply, Drought tolerance, Water purification, Water quality, Water yield, State governments, Regulation, Legislation, Adoption of practices, Administrative agencies, Political aspects, Water treatment, Domestic water, Disinfection, Safety, Economic aspects, Specifications, Water pollution.
Identifiers: *Administrative regulations.

The increase in small privately owned public water supplies makes it difficult for state regulating agencies to maintain proper standards of service, quality, and safety. Small systems are usually inferior to larger ones as to source, facilities, and quality. Few small systems give any treatment and this is a potential hazard. Most systems are installed for domestic use with little thought to adequate fire protection. Small systems are difficult to expand or to incorporate into larger systems. The lack of ample source and storage facilities make, the smaller system vulnerable to drought. Many small systems are owned by real estate developers whose interest ends with the sale of lots served by the system. Better coordination and management of water supply systems is essential to protect the public health. The North Carolina Department of Human Resources is authorized: to adopt standards and criteria for the design and construction of public water supply systems; to require improvements to existing public water supply systems; and to require disinfection of water supplies when coliform bacteria count is high, or when the continued use of the water is potentially hazardous. (Sperling-Florida)
W74-05606

WATER QUALITY AND EFFLUENT STANDARDS.
Md. Code Ann. art. 96A, sec. 27 (Supp 1973).

Descriptors: *Maryland, *Legislation, *Administrative agencies, Specifications, *Waste water disposal, *Waste water treatment, State governments, Water conservation, Public health, Wildlife, Water storage, Sewage effluents, Radioactive wastes, Confined water, Water quality, *Water quality standards, Water wells, Groundwater.

Maryland has enacted water quality and effluent standards applicable to the waters of the state. The standards are to protect the public health and to insure the present and future use of such waters for public water supply, fish and wildlife, recreational purposes, and other legitimate uses. The water quality standards will specify the concentrations of pollutants in water, the minimum permissible concentrations of oxygen and other desirable matter, and the temperature range for the water. Effluent standards will specify the concentrations and the physical, thermal, chemical, biological, and radioactive properties of wastes which may be discharged into the waters. It also prescribes regulations for filling and sealing of abandoned water wells and holes, to prevent groundwater contamination, seepage, and drainage into the waters of the state. The statute empowers the administration to formulate regulations for pesticides and other articles which constitute a water pollution hazard. The methods, facilities, standards, and devices for transfer, storage, treatment, and disposal of oil and other substances, as well as standards and procedures for monitoring pollutants, are also prescribed by regulation. (Sperling-Florida)
W74-05607

POLLUTING OR CONTAMINATING STATE WATERS.
Md. Code Ann. art. 96A sec. 26 (Supp 1973).

Descriptors: *Maryland, *Water pollution sources, *Water conservation, *Permits, *Legislation, Waste water treatment, State governments, Waste water disposal, Discharge(Water), Public health, Treatment facilities, Water pollution treatment, Legal aspects, Administrative agencies, Regulation, Pollutants.

It is unlawful for any person to discharge any pollutant into the waters of the state of Maryland. Any person intending to construct or modify any disposal system or any state-owned treatment facility or any other outlet which would result in a discharge of pollutants or an increase in the

discharge of pollutants must obtain a permit. Such a permit may issue after public notice and opportunity for public hearing on condition that the discharge meets or will meet all applicable state and federal water quality standards. Each permit will be of a term not to exceed five years. A new permit will be issued after the same procedure are followed and conditions are met. Issuance of the permit is contingent upon the grant of a right of entrance upon the permit site at any reasonable time to inspect and investigate for violations of the permit conditions. It may be required of the owner or operator of any source of a discharge of pollutants to: (1) establish and maintain records; (2) make reports; (3) maintain monitoring equipment; (4) sample discharges; and (5) provide other information as to pollutants. Toxic effluent standards may be imposed on industrial users of publicly owned treatment facilities. (Sperling-Florida)
W74-05608

POWER PLANT ENVIRONMENTAL RESEARCH PROGRAM.
Md. Code Ann. art. 66C, sec 767 (Supp 1973).

Descriptors: *Maryland, *Administrative agencies, *Adoption of practices, Research and development, State governments, Legislation, Project planning, Water resources development, Environmental effects, Economic aspects, Permits, Electric power plants, Water conservation, Social aspects, Regulation, Land use, Baseline studies.

Maryland has established a continuing research program for electric power plant site evaluation and related environmental and land use considerations. The Secretary of Natural Resources is to institute effective procedures for coordinating environmental research assignments, so as to prevent the dissipation of money, time, and effort. The state's electric companies will be reimbursed, from the fund created for environmental research, for any environmental research specifically required to satisfy application and permit requirements of federal, state, and local regulatory agencies. To qualify for this reimbursement the electric company must furnish in advance an outline of the program and its estimated cost. Each program will include: (1) general biological and ecological baseline studies; (2) field and laboratory research to assist prediction of the effects of variation of natural waters caused by electric generating plant operations; (3) provisions for monitoring the operations of existing power facilities; (4) research and investigations relating to the effects on air resources; (5) an environmental evaluation of the plant site in regard to the waters of the state; (6) environmental effects of new power generation technologies; and (7) an analysis of the socio-economic impact of electric power generation facilities on the land uses of the state. (Sperling-Florida)
W74-05609

SCENIC RIVERS.
Md. Code Ann. art. 66C, secs. 759-763 as amended (Supp 1973).

Descriptors: *Maryland, *Legislation, *Aesthetics, *Scenery, Water pollution effects, Engineering structures, Recreation, Wildlife management, Water conservation, Rivers, Administrative agencies, Environmental sanitation, Flood protection, Channelization, Fishing, Land management, Project planning, Water resources development, Land use, Water resources, River flow, Obstruction to flow.

The Maryland Scenic Rivers Review Board has been created to protect the scenic, fish, wildlife, and other recreation values of Maryland rivers. The Board is to inventory all potential scenic river sites. The statute gives a description of what rivers, streams, or sections of streams and related adjacent lands may be recommended to be included in the system of scenic rivers. The scenic river program is designed to provide wise management of the resources on the land and preservation of their scenic qualities. Development is to be limited to activities such as fishing, hunting, hiking, etc. A study and plan for use and development of water and related land resources for public and private use will be promulgated for each of the components of the Scenic Rivers System. In all planning for the use and development of water and related land resources, including the construction of diversions, roadways, crossings, channelization, locks, and canals, full consideration must be given to the river as a scenic resource. The Secretary of the Maryland Department of Natural Resources must approve any structure impeding the natural flow of a scenic river. (Sperling-Florida)
W74-05610

STATE WETLANDS.
Md. Code Ann. art. 66C, sec 720 (Supp 1973).

Descriptors: *Maryland, *State governments, *Riparian rights, *Legal aspects, *Boundaries(Property), Riparian land, Riparian waters, Navigable waters, Accretion(Legal aspects), Avulsion, Bank erosion, Reclamation, Shore protection, Engineering structures, Administrative agencies, Legislation.

A natural person who owns land bounding on navigable waters is entitled to all natural accretions to his land. Such a party may reclaim fast land lost by erosion or avulsion during his ownership of the land after January 1, 1972. The extent of this reclamation is to provable preexisting boundaries. Improvements into the waters in front of his land are allowed for the purposes of preserving his access to navigable water or protecting his shore against erosion. An improvement, after construction, is the property of the owner of the land to which it is attached. Other uses approved by the Maryland Board of Public Works are not excluded by the operation of this section. (Sperling-Florida)
W74-05611

SANITARY FACILITIES FUND.
Md. Code Ann., art. 43, sec. 387B (1971).

Descriptors: *Maryland, *Administrative agencies, *Adoption of practices, *Coordination, Project planning, Economics, State governments, Decision making, Engineering structures, Public health, Waste water disposal, Waste water treatment, Solid wastes, Budget, Sewage disposal, Drainage systems, Conduits, Legislation, Governmental interrelations.
Identifiers: *Administrative regulations.

This statute establishes a fund to be utilized in the planning and construction of water and sewerage facilities and for solid waste disposal systems and solid waste acceptance facilities. The Maryland State Department of Health is authorized to utilize funds appropriated in the State operating budget which provides for general local health services. The proportion of State, county, and local funds shall be that which is specified for the financing of minimum health services. The construction segment of the funds shall be available to finance the basic main facilities of a sewerage system for the collection and treatment of sewage and industrial wastes from lateral or collector sewers. The State Department of Health and the local governments are authorized to enter into joint financing agreements for the utilization of whatever federal grants may be available. In the event that a special governmental agency is created to provide sanitary facilities within a county or municipality, the funds cited in this section may be available to such an agency. (Sperling-Florida)
W74-05612

WATER MANAGEMENT AND THE ENVIRONMENT.
Organization for Economic Co-Operation and Development, Paris (France). Water Management Section Group.
For primary bibliographic entry see Field 6G.
W74-05625

THE EXTERNALITIES OF A TORREY CANYON SITUATION; AN IMPETUS FOR CHANGE IN LEGISLATION,
McCarty and Noone, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05628

LEGAL-ECONOMIC ASPECTS OF FISHERIES SESSION SUMMARY,
Louisiana State Univ., Baton Rouge. Law School.
H. G. Knight.
In: Proceedings of Fourth National Sea Grant Conference, October 12-13, 1971, Madison, Wisconsin, 1225 West Dayton Street, Sea Grant Program, University of Wisconsin, Madison, p 187-189.

Descriptors: *Fisheries, *Fish management, United States, Legislation, Economics, Legal aspects, Oceans, United Nations, Federal government, Decision making, Research and development.
Identifiers: Sea Grant.

A wide range of problems concerning international fishery management were considered by a National Sea Grant Program panel on 'Legal-Economic Aspects of Fisheries,' which met on October 13, 1971. One issue was the legal and economic aspects of the conservation of the living resources of the high seas. Also considered were the legal and economic aspects of the allocation of fisheries management, as well as Article III, which is the United States' proposal for international fishery management as presented to the United Nations Seabed Committee. The fourth major issue was the question of decision-making procedures in the United States Government on fisheries and other law of the sea matters. Only the issues raised are identified in this summary articles, with no reference to the main substance of that discussion. However, the issues were related to the role which Sea Grant support recipients might play in assisting in a solution of the issues. (See also W74-05644) (Pinsky-Wisconsin)
W74-05649

FISHERY PROBLEMS AND THE U.S. DRAFT ARTICLE,
Resources for the Future, Inc., Washington, D.C.
F. T. Christy, Jr.
In: Proceedings of Fourth National Sea Grant Conference, October 12-13, 1971, Madison, Wisconsin, 1225 West Dayton Street, Sea Grant Program, University of Wisconsin, Madison, p 200-217. 19 ref.

Descriptors: *Fishing, *Fish management, *International law, Economic impact, Conservation, Legislation, Oceans, United States, Military aspects, Submarines, Social aspects, Economic efficiency.
Identifiers: Distribution of wealth, Social sciences, U.S. Draft Article on Fisheries.

In order to provide a background for an assessment of the United States Draft Article on Fisheries, three main points were discussed. The first is that freedom of fishing is no longer a viable concept, for increased demand for these limited supply resources has resulted in depletion, causing one unit's usage to diminish the value to other units. Another point of discussion is that of distributing the ocean's wealth, the means of distribution of wealth, and the criteria for distribution of wealth. The third point is that the problems to be solved are complex and require consideration by

social scientists if they are to be resolved without conflict. The U.S. Draft Article on Fisheries seeks to preserve the status quo, with little relevance for the developments that are taking place and no useful guide for future decisions. U.S. military interests in the sea provide a severe constraint on the potential of the U.S. Draft Article. Other shortcomings of the Article were caused by lack of input from the concerned public and limited social science research in this area. (See also W74-05644) (Pinsky-Wisconsin)
W74-05650

AN OVERVIEW OF THE JULY-AUGUST 1971 PREPARATORY SESSION OF THE LAW OF THE SEA,
Department of State, Washington, D.C. Office of the Legal Advisor.
M. H. Nordquist.
Proc. available from the National Technical Information Service as COM-72-11408, $3.00 in paper copy, $1.45 in microfiche. In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 6-10, 1972.

Descriptors: *Law of the Sea, *Legislation, *Conferences, Navigation, United Nations, Treaties, Fisheries, International waters, Reasonable use, Water pollution control, Research and development.
Identifiers: Seabed exploitation, National jurisdiction, Marine pollution, Geneva(Switzerland).

A perspective is given of the current stage of international negotiations on the Law of the Sea. Two preparatory sessions of a comprehensive Law of the Sea conference (1973) have been scheduled by the United Nations General Assembly. Subcommittee I will prepare draft treaty articles on an international regime for the seabed area beyond the limits of national jurisdiction. Subcommittee II will compile a comprehensive list of, and draft treaty articles on, subjects and issues relating to traditional Law of the Sea matters such as the territorial sea, international straits, and fisheries. Subcommittee III will deal with preservation of the marine environment and scientific research. The United States stressed the desirability of internationally agreed standards as well as the important role of the specialized agencies of the United Nations and various inter-governmental groups in coping with marine pollution. The question of freedom of scientific research in the oceans was the subject of some differences of opinion. While meaningful negotiations are just beginning, the number and quality of the presentations in Geneva did indicate that systematic progress was being made, as articulation of national interests is a necessary first step. (See also W74-05652 thru W74-05659) (Jones-Wisconsin)
W74-05651

ACCEPTABILITY TO THE FISHING INDUSTRY OF THE CURRENT U.S. POSITION ON FISHERIES. ARTICLE III -- LAW OF THE SEA CONFERENCE -- 1973,
National Shrimp Congress, Inc., Key West, Fla.
W. R. Neblett.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 11-14, 1972.

Descriptors: *Marine fisheries, *Law of the Sea, *Conferences, *United States, United Nations, International law.

The United States fishing industry takes strenuous exception to the U.S. official position, submitted as Article III, Law of the Sea Conference. The similarity of proposals advanced by the U.S. as a 'trustee zone' and Mexico as a 'management' concept is construed as an attempt to provide a device to allow some foreign fishing. Fisheries seek to be heard in the inner circles of government in order to advise at critical times as to the proposals tabled, both with regard to domestic fisheries and with regard to the reactions of foreign governments. Most major fisheries submitted concrete proposals at the 1971 University of Rhode Island Law of the Sea session, which sought to safeguard the proponent's interests and at the same time offer solutions for other U.S. fisheries. Subsequent to the University of Rhode Island meeting, representatives of tuna, shrimp, and salmon fisheries met in Los Angeles and prepared a joint statement which reflected acceptable positions for these giants, whose total production in dollars represents over 60% of the total U.S. flag production. It is predicted that unless the true significance and importance of a U.S. position on fisheries emerges, the presently planned tactic will fail. (See also W74-05651) (Auen-Wisconsin)
W74-05652

ALTERNATIVES TO THE CURRENT U.S. POSITION ON FISHERIES,
Miami Univ., Coral Gables, Fla. School of Law.
T. A. Clingam, Jr.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 15-18, 1972.

Descriptors: *United States, *Marine fisheries, *Law of the Sea, Legislation, Coasts, Navigation, Priorities, Management, Zoning.
Identifiers: Territorial seas, Coastal waters.

It is suggested that Article III of the Law of the Sea Conference include the establishment of a zone of at least limited coastal state jurisdiction that would enable the state to implement timely and effective fishery management and afford economic protection to coastal state fisheries. Regulations pertinent to such a management scheme necessarily pertain to stocks which do not conform to artificial boundaries, although the drawing of such lines may be required for enforcement purposes and for the clear delineation of economically significant zones. However, such lines should be constructed on biological rather than geometrical criteria. A proposal for effective management should also permit the coastal state to maximize its sustainable returns, reserving the remaining catch, if any, to other nations. More responsible, and smaller, groups of nations having realistic interests in the regulated stock should be formed, and care should be taken how the participating nations are identified. The scheme must have some effective mechanism for settlement of disputes. The seeming intransigence with regard to freedom of transit, if it persevers, will leave scant hope for acceptance of the U.S. proposal. Failure to agree would stimulate a period of unrestricted unilateral claims to increased coastal state competition, an inherently self-destructive solution. (See also W74-05651) (Auen-Wisconsin)
W74-05653

FOREIGN FISHING OFF THE SOUTHEASTERN UNITED STATES UNDER THE CURRENTLY ACCEPTED CONTIGUOUS SEA LIMITATION,
National Marine Fisheries Service, St. Petersburg, Fla. Southeast Region.
C. M. Fuss, Jr.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 19-32, 1972. 8 fig, 3 tab, 4 ref.

Descriptors: *Gulf of Mexico, *Marine fisheries, *International law, Treaties, Southeast U.S., Atlantic Ocean, Pacific Northwest U.S., Commercial fishing, Northeast U.S., Shrimp.
Identifiers: *Foreign fishing, *Surveillance, Caribbean Sea.

Control of foreign fishing beyond the 12 mile fishery zone can only be regulated by bilateral and multilateral international fishery agreements. The extent of foreign fishing between October 1970 and October 1971 off the southeastern U.S., the Atlantic coastal waters south of 37 degrees north latitude and the Gulf coastal waters from Florida to the Mexican border are summarized. Surveillance flights are scheduled through the Coast Guard in Miami and New Orleans. Additional sighting reports are obtained from state conservation agencies, commercial and sports fishermen and U.S. merchant vessels. The estimated foreign catch of 100 million pounds of the southeastern U.S. amounted to about 8% of the foreign catch off the northeastern U.S. in 1970 (1.3 billion pounds) and about 5% of the U.S. domestic catch in the southeast region. It is compared with the northeastern U.S. where the foreign catch is currently about 98% of the domestic catch. Comparison of the estimated value of Atlantic and Gulf foreign catches gives further insight into possible problems in the Gulf area. Uncontrolled foreign fishing would constitute a significant threat to the shrimp industry of the southeastern United States. (See also W74-05651) (Jones-Wisconsin)
W74-05654

POLLUTION MANAGEMENT IN THE COASTAL STATES,
Coastal States Organization, Savannah, Ga.
T. H. Suddath.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 42-47, 1972. 1 fig.

Descriptors: *Water pollution control, *Regulation, *Pollution abatement, *Management, *Coasts, Political constraints, Estuaries, Marshes, Wetlands, Oceans, Recreation, Islands, Legislation, State governments.
Identifiers: *Coastal zone management.

A state structure for the management of pollution in the coastal zone based on a systems management concept is presented. Key management areas are defined as fresh water pollution, mineral deposits, air pollution, coastal marshlands, wetlands, estuaries and recreational areas. Key issues involved in coastal zone pollution management involve definition of the extent of management control, allocation of responsibility among various levels of government and delineation of the management areas. The proposed state management structure complements the three new federal agencies (Environmental Protection Agency, National Oceanic and Atmospheric Administration, Council for Environmental Quality), thus facilitating participation in their grants and regulatory programs. This structural parallel allows a balance between local and federal interests. The state management structure includes an Environmental Protection Agency and an Environmental Quality Council to serve as a sort of grand jury and to make recommendations to the governor. (See also W74-05651) (Weaver-Wisconsin)
W74-05655

FLORIDA'S RATIONALE FOR COASTAL ZONE MANAGEMENT,
Florida Dept. of Natural Resources, Tallahassee. Coastal Coordinating Council.
F. Barloga, L. Burney, and B. Johnson.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 62-67, 1972.

Descriptors: *Florida, *Environmental effects, *Water resources development, *Comprehensive planning, Management, Natural resources, Coasts, Preservation, Conservation, Land use, Zoning, Compatibility.

Identifiers: *Florida Coastal Zone Master Plan, Development.

Because the coastal zone is Florida's most important asset, great care must be taken in choosing tools to alleviate adverse effects of coastal development. Currently existing tools which provide potential for effective coastal zone management are essential but inadequate to accomplish their goal. The Florida Coastal Coordinating Council created in 1970 presents the first opportunity for state level research, coordination and planning necessary for orderly development and optimum use of coastal areas. The council will plan maintenance and improvement of environmental quality and encourage joint use of resources by compatible activities or provide for allocation of exclusive use by non-compatible activities to maximize the retention of options for the future. Preliminary accomplishments and problems encountered by the council are reviewed. (See also W74-05651) (Weaver-Wisconsin)
W74-05657

CAN COASTAL RESOURCES SURVIVE DEVELOPMENT,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
B. J. Yokel, and D. C. Tabb.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 68-71, 1972. 1 fig.

Descriptors: *Florida, *Habitat improvement, *Wildlife conservation, Environmental effects, Management, Land use, Permits, Coordination, Conservation, Planning, Aesthetics.
Identifiers: *Coastal Zone management, Real estate development, Compatible use.

Coastal bay bottom, estuarine, and marshland development, once encouraged by policy, has become subject to tighter control as the ecological role of these coastal systems has become better understood. A plan for statewide coastal management is being developed by the Coastal Coordinating Council of the Florida Department of Natural Resources. However, as an example of privately initiated alternatives for coastal management in the absence of the Coastal Coordinating Council, the case of the establishment of the Rookery Bay Sanctuary by the efforts of a small group of concerned citizens is reviewed. Organization, initiated in response to private real estate development plans, led to a substantial grant by the National Audubon Society and the establishment of the Sanctuary, not only as a preserve, but as a field area for multidisciplinary study of effects of upland development. (See also W74-05651) (Weaver-Wisconsin)
W74-05658

STATE-FEDERAL MANAGEMENT INITIATIVE,
National Marine Fisheries Service, St. Petersburg, Fla. Southeast Region.
R. T. Whiteleather.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 72-74, 1972.

Descriptors: *Management, *Marine fisheries, *State governments, *Federal government, Commercial fishing, Regulation, Legislation, Economics, Social aspects, Fish conservation.
Identifiers: *Marine resources, *Coastal Zone management, International exploitation, Limited entry.

The National Oceanic and Atmospheric Administration has been assigned responsibility for conservation and wisest utilization of the total living marine resource. In the organization's restructuring to deal with the complex assignment, State-Federal fishery management iniative is a key approach designed to develop cooperative management plans. Migratory marine fisheries would be under national management, while states would have greater responsibility for regulation of fisheries within their contiguous fishery zone. Implementation of the initiative will involve careful delineation of international, national, and state guidelines for fishery management and the careful investigation of alternative state and/or federal management systems. Preliminary efforts have already begun, but resolution of implementation problems is expected to require several years of research. Several fundamental problems in this area are mentioned. (See also W74-05651) (Weaver-Wisconsin)
W74-05659

INTERNATIONAL MANAGEMENT OF THE RIO GRANDE BASIN - THE UNITED STATES AND MEXICO,
University of Western Ontario, London. Dept. of Geology.
For primary bibliographic entry see Field 4A.
W74-05664

WATER-MANAGEMENT PROBLEMS RELATED TO GROUNDWATER RIGHTS IN THE SOUTHWEST,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W74-05683

THE STRUCTURE OF MANAGEMENT AND PLANNING FOR THE COASTAL ZONE,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W74-05702

SEWAGE WORKS OF MUNICIPAL CORPORATIONS AND SANITARY DISTRICTS,
W. Va. Code Ann., Secs. 16-13-1 through 16-13-8 (1967).

Descriptors: *West Virginia, *Legislation, *Waste treatment, *Supervisory control, *Environmental sanitation, Water quality control, Public health, Sewage treatment, Waste disposal, Waste water, Waste water treatment, Administrative agencies, Structures, Municipal wastes, Discharge, Drainage, Water pollution treatment, Pollution control, Pollution abatement, Legal aspects.

Municipal corporations and sanitary districts are authorized to own, acquire, construct, equip, operate and maintain sewage collection systems, sewage treatment plants, intercepting sewers, outfalls, and all other appurtenances necessary or useful for the collection, treatment, purification and disposal of the liquid and solid wastes of sucn municipal corporations or sanitary districts. A sanitary board shall be appointed to supervise the construction, acquisition, equipment, operation and maintenance of any such works for the collection, treatment and disposal of sewage and the collection of revenuse derived from those services. The board shall also have the power to hire personnel, enter contracts, make improvements, extensions and replacements of existing public works. In addition the board may also acquire property necessary to carry out its statutory functions. (Silber-Florida)
W74-05745

PUBLIC SERVICE DISTRICTS FOR WATER AND SEWERAGE SERVICES.
W Va Code Ann, secs 16-13a-1 through 16-13a-9 (1953).

Descriptors: *West Virginia, *Legislation, *Cities, *Waste treatment, *Water quality control, Sewage disposal, Sewage treatment, Treatment facilities, Municipal wastes, Municipal water, Waste disposal, Environmental sanitation, Environmental engineering, Administrative agencies, Structures, Water resources.

The formation of public service districts is authorized in any territory constituting the whole or any part of one or more counties. The purpose of the districts is to preserve the public health by purchase, construction, maintenance, or operation of properties supplying water or sewerage services within such territories. The district, when formed, shall be a public corporation and political subdivision, but without any power to levy or collecte ad valorem taxes. Each district may acquire, own and hold property, hire personnel, enter contracts and enter into agreements for furnishing wholesale water supply for distribution. Whenever such district shall have constructed, acquired or established water or sewer facilities for services within any given area, no city, incorporated town, or other municipal corporation shall thereafter construct, acquire or establish any facilities of the same kind within such area without the consent of such district. The district shall also establish rates and charges for the services and facilities it furnishes. (Silber-Florida)
W74-05746

A BILL TO AUTHORIZE A PROGRAM TO DEVELOP AND DEMONSTRATE LOW-COST MEANS OF PREVENTING SHORELINE EROSION.
Senate Bill 19, 93d Cong, 1st sess (1973).

Descriptors: *Inter-agency cooperating, *Federal project policy, *Erosion control, *Diversion structures, *Administration, Bank erosion, Legislation, Federal government, Water resources development, Inter-agency comm. on water resources, Project purposes, Water policy, Research and development, Water resources, Coastal engineering, Coastal structures.

This bill is a plan to develop, demonstrate, and disseminate information about low-cost means to combat shoreline erosion. The program will be administered by the Department of the Army in cooperation with the Agriculture Department and consist of planning, constructing, operating, evaluating and demonstrating prototype shoreline erosion control devices, both engineered and vegetative. Demonstration projects shall emphasize the development of low-cost shoreline-erosion control devices located on sheltered or inland waters, reflecting a variety of geographical and climatic conditions. An advisory panel is to be set up consisting of knowledgeable representatives from various geographical areas and experts in fields of significance to this work. The panel shall advise generally, recommend site criteria, review progress periodically, and recommend dissemination means. The Secretary of the Army shall submit an annual report to the House Public Works Committee and the final report shall include a comprehensive evaluation of the national shoreline erosion control development program. (Sutton-Florida)
W74-05747

NATURAL AREAS PRESERVATION.
Tenn Code Ann, secs 11-1701 thru 11-1715 (1971).

Descriptors: *Tennessee, *Legislation, *Administration, *Protection, *Conservation, *Proprietory power, Law enforcement, State governments, Recreation, Federal government, Management, Planning, Penalties(Legal), Legal aspects, Natural resources.
Identifiers: Scenic easements.

The purpose of natural areas preservation is to protect those areas which are in peril of being

destroyed or substantially diminished by polluting activities. The Act was promulgated since there has been no protective regulation until this one. The Act provides for administration by the department of conservation together with the game and fresh water fish commission. There shall be two classifications of areas, one for scenic-recreational areas, another for natural-scientific areas and premitted uses in each shall be limited to foot trails, scienic vistas, and small picnic areas. However in the second class, at the Commissioner's discretion, such use can be limited further. An annual report is required, the legislature will designate the areas, and a two year period is given for initial development. Power to acquire lands and waters is given to the Comimissioner in the name of the State, preferably to acquire scenic easements. Finally, cooperation and reports of other agencies are requested and private areas are to be registered and maintained. The penalty for violators is to be levied at $100 per day, such violations to be prosecuted by district attorneys-general. (Sutton-Florida)
W74-05748

UNLAWFUL SEWAGE DISPOSAL.
Tenn Code Ann secs 39-2209 thru 39-2211 (1955).

Descriptors: *Public health, *Legislation, *Sewage disposal, *Administration, *Penalties(Legal), Tennessee, Law enforcement, Local government, Water pollution control, Pollutant identification, Water pollution sources, Sewage effluents, Water pollution, Effluents, Industrial wastes, Water wells.

It shall be unlawful for any person, organization, partnership, corporation or other entity to dispose of water carrying human waste, household or business waste, or to pipe or transmit raw sewage or the effluent from any septic tank or other sewer system, into any abandoned well, cave, sink hole, open ditch or any well drilled or dug for the purpose of disposing of sewage. It shall be the duty of the local health officers to enforce these provisions. Any person or entity violating these provisions shall be guilty of a misdemeanor, and each day of continued violation, after conviction, shall constitute a separate offense. (Ritchie-Florida)
W74-05749

WILL SUCCESS SPOIL NEPA,
M. Zeldin.
Audubon, Vol 74, No 4, p 106-111, July 1972. 1 illus.

Descriptors: *Statutes, *Federal government, *Court decisions, *Political aspects, Industries, Aesthetics, Permits, Administrative agencies, Decision-making, Local governments, Public health, Environmental sanitation, Social need, Social value, Environment, Environmental effects, Regulation.
Identifiers: *Environmental impact statement, *National Environmental Policy Act, Standing(Legal), Public trust doctrine, Sovereign immunity, Citizen lawsuits.

The National Environmental Policy Act (NEPA) required all federal agencies to prepare an environmental impact statement on any proposed action significantly affecting the quality of the human environment. This law worked well toward creating citizen lawsuits. Piqued citizen suits and prodded by its industry friends, the government has tried to keep environmentalists from having their day in court. The government often argues standing and sovereign immunity, and also attempts to have high bonds set to make it financially impossible for organizations to undertake court action. But the courts have sustained enough citizen lawsuits to make it a weapon to be feared. Many federal agencies and some members of Congress prefer to have business as usual without outside interference. This has produced an environmental backlash: (1) the House passed a bill allowing the Atomic Energy Commission (AEC) to issue licenses for nuclear plants without studying their environmental impact; (2) Nixon administration proposals to create loopholes in the NEPA; and (3) restrictions on citizen court suits. The administration has attempted to pit environmental objectives against economic objectives and show their incompatibility. The 1899 Refuse Act is the major government enforcement tool and perhaps because of this, is endangered by pending bills. Until there is an effective national program of legislation and enforcement, individual citizens and public groups must be able to go to court and push agencies and legislators into action. (Sperling-Florida)
W74-05750

SOIL AND WATER CONSERVATION.
Minn Stat Ann, secs 40.01, 40.02 (Supp 1973), as amended, ch 412, sec 9 (1973) Laws of Minn.

Descriptors: *Land development, *Soil erosion, *Soil conservation, *Soil management, *Water resources development, *Land use, Minnesota, Legislation, Administration, Recreational development, Erosion control, Land development, Wildlife, Land resource development, Siltation, Flood control.

The public policy is to provide for the conservation of the soil resources of the state of Minnesota and to control and prevent soil erosion through land resource planning and development. Improper land use and failure of land occupiers to change their methods are the reasons for such legislation. The Act sets forth ways to rectify the situation by implementing land use practices that will effectively reduce siltation and loss of land base through activities associated with farming, mining, construction and forestry. The Act is also aimed at flood prevention and the conservation, development, utilization, and disposal of water, included but not limited to measures for fish, wildlife and recreational development. (Sutton-Florida)
W74-05751

MUNICIPAL WATER POLLUTION CONTROL--STANDARDS OF QUALITY AND PURITY.
Minn Stat Ann, sec 115.44 (Supp 1973), as amended, ch 374, secs 15, 16 (1973) Laws of Minn.

Descriptors: *Water pollution, *Water quality standards, *Water pollution control, *Water resources development, Legislation, *Minnesota, Water law, Legal aspects, Municipal governments, Public health, Administrative agencies, Sewage effluents, Water pollution sources.

These amended sections are aimed at attaining the objectives established by the statutes dealing with water pollution and water quality. The Minnesota pollution control agency is given the power, whenever practical and advisable, to establish standards specifying quality and purity or maximum permissible pollutional content of effluent, without regard to water quality standards. There are two provisos regarding this new power; that such new standards will assure the protection and propagation of a balanced, indigenous population of fish and wildlife in the body of water and that any point source of a discharge having a heat component shall not be subject to more stringent effluent limitations, with regard to that heat component that those previously established for such facility. The statute deals with conflicts between state laws and similar federal provisions and compliance with such state laws are waived to the extent necessary to enable the agency to comply with federal laws, rules, and regulations. (Sutton-Florida)
W74-05752

WATER POLLUTION CONTROL--ENFORCEMENT.
Minn Stat Ann, sec 115.071 (Supp 1973), as amended, ch 374, sec 13 (1973) Laws of Minn.

Descriptors: *Water pollution control, *Water quality standards, *Enforcement, *Remedies, Statutes, Water law, Legal aspects, *Minnesota, Administrative agencies, State jurisdiction, Adjudication procedure, Water quality control, Water resources.

Listing various remedies available, including criminal prosecutions, civil penalties, injunctions and actions to compel performance, the amended statute deals with the enforcement of water pollution control laws. The criminal provisions distinguish between wilful and negligent actions. Although the maximum limits of not more than $25,000 per day in violation of a law or order and/or imprisonment of up to one year are the same in both categories, and the statute also provides for harsher penalties for further convictions, the statute further provides for criminal penalties where there is tampering with monitoring and information devices, and designates the enforcement duties. Civil penalties are then outlined, as well as acceptable defenses for violative actions and all actions are to be brought by the attorney general in the name of the state. Injunctions can be issued against such action if they would create a public nuisance and again are to be sought by the attorney general. In actions to compel performance, private defendants adjudicated responsible may be compelled to do and perform any and all acts within their power reasonably necessary to accomplish the order's purpose. The statute also covers actions in which the defendant is a municipality or other governmental agency. (Sutton-Florida)
W74-05753

DRAINAGE.
Minn Stat Ann, sec 106.021 (Supp 1973), as amended, ch 479, secs 4, 5, 6, 7 (1973) Laws of Minn.

Descriptors: *Minnesota, *Drainage engineering, *Drainage systems, *Flood control, *Water works, *Local governments, Surface waters, Water management(Applied), Water control, Water distribution(Applied), Regulation, Drainage programs, Administrative agencies, Administration, Legislation, Drainage districts.
Identifiers: *Administrative regulations, Fill permits, Licenses.

Power is conferred on the county boards and district courts to make all necessary orders for the construction and maintenance of public drainage systems. These drainage systems can be extended into or through any municipality to find an outlet. No lake will be drained or natural water course channelized if it is a part of the public waters of the state. These same measures can be taken for flood control except that public waters cannot be affected without approval of the Commissioner of Natural Resources. The petitioners for any public ditch, or the county board or court may ask for the commissioner's approval. The commissioner is to make a list of criteria for the board and court to consider when establishing and improving drainage systems. The criteria are to relate to the social, economic, and environmental impact of the proposed drainage system. The criteria will be limited to the following: cost-benefit analysis, public and private; analysis of present and future agricultural land acreage; flooding characteristics of project lands; alternative measures; water quality effects of the project; effects on fish and wildlife resources; and the overall environmental impact. (Sperling-Florida)
W74-05754

FLOOD PLAIN MANAGEMENT.
Minn Stat Ann, secs 104.01 to 104.07 (Supp 1973), as amended, ch 412, sec 10, ch 351, secs 1-8 (1973) Laws of Minn.

Descriptors: *Water yield improvement, *Water supply, Water resources development,

*Watershed management, *Flood plains, *Minnesota, Nonestructural alternatives, Flood protection, Flood plain zoning, Flood control, Erosion control, Flood damage, Legal aspects, Water law, Legislation.

Reducing flood damages through flood plain management, stressing nonstructural measures including flood plain zoning, flood proofing and flood warning practices constitutes the Minnesota statute's purpose. In furtherance of this goal, flood plain management ordinances are to be considered first and local governmental units must adopt them before seeking alternative methods. The powers are given to the commissioner of natural resources, who shall conduct periodic inspections to determine the effectiveness of local programs, including an evaluation of the enforcement of and compliance with, local flood plain management ordinances. Due consideration is to be given to the needs of an industry whose business requires it to be located within a flood plain. When the commissioner determines that sufficient technical information is available for the delineation of flood plains and floodways on a watercourse, he shall notify affected governmental units that such information is available. Every structure, fill and deposit, placed or maintained in violation of an ordinance shall be considered a public nuisance and may be enjoined. Such violation exists shall be a separate offense. (Sutton-Florida)
W74-05755

WATER RESOURCES MANAGEMENT.
Minn Stat Ann, secs 378.31, 378.32 (Supp 1973), amended, ch 702, secs 4, 5 (1973) Laws of Minn.

Descriptors: *Water resources, *Water resources development, *Project purposes, *Water conservation, *Local governments, Statutes, Water law, *Minnesota, Water supply, Administrative agencies, Land resources, Water users, Watershed management, Water yield improvement, Interagency cooperation.

To enhance the use and enjoyment of Minnesota's lakes, a statewide improvement program is established to preserve the natural character, improve water quality, provide for water quantity and to assure protection of the lakes from man's detrimental activities and certain natural processes. The power to enforce the sections of the statute is given to the county board and all programs undertaken pursuant to such powers shall be consistent with statewide water and related land resources plans. Powers shall include acquiring any existing dam or control works by various means, projects to change course current, and to construct and operate water control structures. Further, the county board may undertake research to determine the condition and development of the body of water and water entering it by developing a comprehensive plan to eliminate water pollution. Other related powers are also listed, including water surface use regulation by ordinances and such proposed zoning ordinances shall be submitted to the commissioner of natural resources for approval. The board's broad powers also include regulating and policing public beaches, regulating construction and maintenance of commercial marinas and related facilities and all other structures associated with the state's water resources. (Sutton-Florida)
W74-05756

POLLUTION CONTROL AGENCY.
Minn Stat Ann, secs 116.21 to 116.29, 116.32 to 116.35 (Supp 1973).

Descriptors: *Pollutants, *Water pollution control, *Water pollution sources, *Water treatment, *Water conservation, *Minnesota, Legislation, Administration, Administrative agencies, Detergents, Phosphates, Water quality, Control, Water supply, Water quality control, Legal sanctions, Eutrophication.

This Minnesota statute seeks to encourage the state pollution control agency to set standards limiting the amount of nutrients in various cleaning and water conditioning agents, as they eventually lead to an acceleration of the natural eutrophication process of the state's water. Limitations imposed should be made taking several factors into consideration, including the availability of safe, nonpolluting and effective substitutes, the difference in the mineral content of waters, and the differing needs of industrial, commercial and household users. The Act requires certain tests for percentage content of phosphates in laundry or dishwashing compounds and the display of lists setting forth the percentage content in certain products. Seizure of cleaning agents or chemical water conditioners is provided for and after conviction of a violation, provisions are set up for forfeiture and disposal of the compounds. In addition to penalties, the court may order those persons to refrain from any further violations or to cease operation. (Sutton-Florida)
W74-05757

WATER POLLUTION--CLASSIFICATION OF WATER SUPPLY AND WASTE WATER TREATMENT FACILITIES.
Minn Stat Ann, secs 115.71 to 115.82 (Supp 1973).

Descriptors: *Water pollution, *Water supply, Waste water treatment, *Treatment facilities, *Water conservation, *Minnesota, Legislation, Administration, Waste disposal, Public health, Water resources, Water policy, Legal aspects, Water law, Administrative agencies.

Minnesota enacted this statute for the protection of public health and the conservation and protection of water resources. It classifies all public water supply systems and all public waste water treatment facilities and these classes shall be based on the degree of hazard to public health together with the type and loading of plant and the population served or the average population equivalent of the sewage handled. The Act sets up a board of certification which shall issue certificates for operation, to operators meeting such competency and examination standards as may be set up. In certain cases, such certificates may be issued without examinations. A fee schedule and payment procedure is outlined, as well as the board's power, and an effective violation date set. Violations are considered separate offenses and classified as a misdemeanor. (Sutton-Florida)
W74-05758

CONSTRUCTION, RECONSTRUCTION OR MAINTENANCE OF DRAINS.
Ind Ann Stat secs 27-2101 thru 27-2166 (1970).

Descriptors: *Indiana, *Drainage, *Legal aspects, *Legislation, *Drains, Drainage systems, Urban drainage, Controlled drainage, Statutes, Assessments, Drainage engineering, Controlled drainage, Drainage systems.

These statutes relate to the construction of new drains, reconstruction of drains, periodic maintenance and annual assessments. Included are annotations of decisions under prior law. The article on construction of new drains details the petition procedure, the requirements for hearings, the contents of the surveyor's report, the appeal procedure for rejected petitions, remonstrances to petitions, the final report and a schedule of assessments for improvements. The article on reconstruction of drains describes the surveyor's report, schedules of assessments and damages for reconstruction, hearings, grounds for objection and appeal. The section on periodic maintenance and annual assessments deals with drains classified in need of periodic maintenance, maintenance report and schedule of assessments, hearings, time of filing objections, use of maintenance fund for drains, omission of assessment when authorized and minimum annual assessments. (Sears-Florida)
W74-05759

CITY OF KINGS MONTAIN V. GOFORTH (CITY FILES PETITION FOR CONDEMNATION OF BOTTOM LAND AND CONDEMNEES CROSS COMPLAIN FOR DESTRUCTION OF PROPERTY DUE TO FLOODING CAUSED BY DAM).
196 S E 2d 231-239 (N C 1973).

Descriptors: *North Carolina, *Surface waters, *Obstruction to flow, *Barriers, *Streamflow, *Condemnation, *Legal aspects, Eminent domain, Crops, Flooding, Dams, Riparian rights, Water law, Flood damage, Overflow, Alteration of flow, Riparian land.

Municipal corporation filed petition for condemnation of certain bottom land and condemnees filed cross complaint seeking recovery for destruction of crops on the bottom land allegedly due to flooding caused by dam. Held: if condemnees were owners and entitled to possession of land when crops were planted and flooded, evidence as to brief floodings prior to construction of condemnor's downstream dam, as compared with extended flooding and destruction of crops on two occasions after construction of dam, was sufficient for submission to jury as to whether or not condemnor was liable for destruction of crops due to flooding. It was therefore error to grant municipal corporation's motion for directed verdict of dismissal of condemnee's cross action. A lower owner cannot obstruct surface stream of water so as to prevent water from flowing as it naturally would and thereby flood lands and buildings above him, and if he does so he incurs liability for damage done by such flooding. (Sears-Florida)
W74-05760

A BILL TO BE ENTITLED AN ACT RELATING TO COASTAL ZONE MANAGEMENT.
Fla House Bill No 158 (February 1973).

Descriptors: *Florida, *Legislation, *Coasts, *Land management, *Land use, Aquatic animals, Shellfish, Ecology, Environment, Water resources, Wildlife, Nutrients, Erosion, Water utilization, Shores, Coastal marshes, Swamps, Wetlands, Aquatic habitats, Estuaries, Water pollution, Water pollution control, Land development.

It is the declared public policy of Florida to preserve, protect, develop and where possible, to restore or enhance the resources of the state's coastal zone. An agency designated by the governor shall develop a management program which shall include an identification of the boundaries of the coastal zone, a definition of what shall constitute permissible land and water uses within the zone, and finally an inventory and designation of areas of particular concern within the coastal zone. Local governments having jurisdiction in an area of the coastal zone will submit land development regulations to the state agency for approval. Once approval has been granted, amendment or rescission of those rules must again obtain approval of the state agency. These rules and regulations will roughly divide the coastal zone into preservation, conservation and development areas in which no development, limited development and intensive development will be permitted, respectively. These areas will be determined according to the classes of water they contain, as defined by the rules of the department of pollution control. In addition, the agency may adopt rules for the acquisition, development and operation of estuarine sanctuaries for the purpose of creating natural field laboratories. (Ritchie-Florida)
W74-05761

COASTAL ISLAND TRUSTS.
Me Rev Stat Ann tit 12 sec 641-646 (Supp 1973).

Descriptors: *Environment, *Islands, *Development, *Maine, Coasts, Environmental control, Resources, Legislation, State govern-

ments, Coastal structures, Recreation, Environmental effects.
Identifiers: Coastal island trusts, Public trust doctrine.

The purpose of this chapter of the laws of Maine is to provide a means whereby state and local officials, together with federal officials can take action, when appropriate, to protect and manage the coastal islands or groups of coastal islands of the state of Maine. Such protection is to serve the best interests and needs of all the citizens for controlled commercial development and sanctuaries for reaction and relaxation in a manner consistent with the maintenance and improvement of the coastal island environment. For this purpose, a coastal island trust was established with a commission to oversee those islands included by the legislature, for their protection and proper maintenance. The commission is to develop and maintain a comprehensive plan to preserve, restore, and utilize the commercial, natural, scenic, historical, and recreational values of the coastal islands. (Daniels-Florida)
W74-05762

ENVIRONMENTAL LAW--RIVERS AND HARBORS APPROPRIATIONS ACT--PRIVATE PERSONS MAY NOT SUE IN QUI TAM WITHOUT EXPLICIT GRANT OF PERMISSION FOR CITIZEN SUITS.
Fordham University Law Journal, Vol 1, p 480-492, 1973. 63 ref.

Descriptors: *Legal aspects, *Legislation, *Rivers and Harbors Act, Federal Water Pollution Control Act, Water Law, Water pollution, Water pollution control, Common Law, Law enforcement.
Identifiers: Qui tam action.

An action brought by an informer, under a statute which establishes a penalty for the commission or omission of a certain act, and provides that the same shall be recoverable in a civil action, part of the penalty to go to any person who will bring such action and the remainder to the state or some other institution, is called a 'qui tam action' because the plaintiff states that he sues as well for the state as for himself. It has been held that private persons cannot sue in qui tam under the Rivers and Harbors Act, even when the Justice Department fails or refuses to initiate proceedings in accordance with the Act. Since there is no common law right to maintain a qui tam action, the right must be created by statute. The Refuse Act does not creat such a right. Legislation authorizing qui tam actions is needed. Important considerations are justiciability and standing. This need may have been met by the Federal Water Pollution Control Act Amendments of 1972. (Sears-Florida)
W74-05763

WASTE DISCHARGE PERMITS: NO DEFENSE TO WATER POLLUTION ACTIONS,
Lewis and Clark Coll., Portland, Oreg. Northwestern School of Law.
For primary bibliographic entry see Field 5G.
W74-05764

COUNTY OF FREEBORN V. BRYSON (DECLARATORY JUDGMENT ACTION CONCERNING PORTIONS OF A NATURAL WILDLIFE MARSH).
210 N W 2d 290-297 (Minnesota 1973). 8 p.

Descriptors: *Minnesota, *Environmental effects, *Highway effects, *Wildlife habitats, *Wetlands, Natural resources, Construction, Ecosystems, Condemnation, Marshes, Protection, Environment, Judicial decisions, Legal aspects, Public rights, Highways, Road construction.
Identifiers: Environmental Rights Act.

This is an action under the Minnesota Environmental Rights Act in response to condemnation proceedings initiated for the purpose of acquiring certain lands for construction of a highway. The main issue on appeal concerned the limitations on the country's power to condemn land for a public use. The plaintiffs owned the farmland which contained marsh lands and wetlands. Experts testified that the area provides a unique natural ecosystem or environment because of its capacity to support a great diversity of life. The defendant county proposed to condemn a strip of the farm for construction of a highway. Expert witnesses gave opinions that the construction would have significant detrimental effect on the area's value as wildlife area. The court held that under the Act, any person may maintain an action for declaratory or equitable relief for protection of natural resources; that the act limits condemnation for public highways; that material evidence could be shown to establish a prima facie case of adverse effects on the environment; and that the county could rebut by showing no proven or feasible alternative or that its conduct was in the public's interest. (Daniels-Florida)
W74-05765

WILDERNESS PRESERVATION II: BRINGING THE CONVENTION INTO COURT,
Environmental Law Inst., Washington, D.C.
T. Guilbert.
Environmental Law Reporter, Vol III, No 6, p 50044-50050, June 1973. 65 ref.

Descriptors: *International law, *Conservation, *Protection, Wildlife management, Wildlife conservation, Legal aspects, Environmental effects, Ecology, Treaties, Judicial decisions, Wildlife, Wildlife habitats.
Identifiers: *Injunctive relief, *Convention on Nature Protection and Wildlife Preservation, *Organization of American States.

The Convention on Nature Pretection and Wild Life Preservation in the Western Hemisphere is an agreement between the member nations of the Organization of American States (OAS) to maintain strict wilderness reserves inviolate. In many environmental protection suits, the Convention may well provide independent grounds for a decision to enjoin activities which would have detrimental effects on wilderness areas. If the judge decides to protect the wilderness area in question, it is simple for him to invoke the Convention's edict by merely citing the supremacy clause of the United States Constitution which makes treaties the supreme law of the land. There may be difficulties, however, in demonstrating to a court that it is the court's non-discretionary duty to give effect to the convention. It must be shown that the area satisfies all of the criteria for strict wilderness reserves, that the area is either listed as a wilderness reserve with the OAS or that its non-listing has no legal effect, that there is standing to invoke the Convention in this litigation, and that the use sought to be prevented is not 'consistent with the purposes for which the area was established.' (McKnight-Florida)
W74-05766

A BILL AMENDING THE PUBLIC HEALTH SERVICE ACT AND THE FEDERAL FOOD, DRUG, AND COSMETIC ACT IN ORDER TO ASSURE SAFE DRINKING WATER.
House Bill 1059, 93rd Cong, 1st sess (1973). 30 p.

Descriptors: *Potable water, *Water quality standards, *Public health, *Legislation, Governmental interrelations, Federal government, Government finance, State governments, Administrative agencies, Regulation, Water quality.
Identifiers: Notice.

The Administrator of the Environmental Protection Agency shall publish proposed national primary drinking water regulations within 180 days after the enactment of this title, and he shall publish proposed national secondary drinking water regulations within 270 days after such enactment. Primary drinking water standards shall specify the maximum permissible level in water of each contaminant which in the judgment of the Administrator may have any adverse effect on the health of persons and shall contain criteria and procedures to assure a supply of drinking water which dependably meets the standards promulgated by the Administrator. The states are given primary enforcement responsibility for the public water systems but if the Administrator determines that any public water system in any state does not comply with the national primary standards, he may after 30 days give notice to such state and subsequently commence a civil action. Notwithstanding any other provision of the title, the Administrator, upon receipt of information that a contaminant which is present in or is likely to enter a public water system may present an imminent danger, may immediately take such actions as he may deem necessary. (McKnight-Florida)
W74-05767

COUNTY CONTROL OF DAM CONSTRUCTION.
Mich Comp Laws Ann, sec 46.22 (Supp 1973).

Descriptors: *Michigan, *Dam construction, *Dam design, *Administrative agencies, *Permits, State governments, Navigable rivers, Water law, Legislation, Regulation, Dams, Engineering structures, Bypasses.

If any person desires to construct a dam, a specification. A new section of this statute provides that any permit to build a request to construct the dam must be presented to the board of supervisors, for their approval, setting forth the dam's dam across a navigable stream shall provide for an easement to the public for an adequate and proximate right of way for the portage of small craft around the dam. Notice of the petition must be published at least three weeks in advance of a mandatory hearing. All owners of land affected must be notified by registered mail. The board has no power to grant the right to anyone to take or injure the lands of another, or to abrogate any requirements set forth in the statutes in the consequence of building the dam. The board must send a copy of any petition for permission to build a dam to the secretary of the natural resources commission along with notice of the time and date of hearing. (Flowers-Florida)
W74-05768

SMITH V. CRUTHIS (INJUNCTION TO PROHIBIT LEVEE AND TO RECOVER FOR CROP DAMAGE).
499 S W 2d 852 (Ark 1973).

Descriptors: *Arkansas, *Levee, *Dike, *Surface runoff, Legal aspects, Judicial decisions, Flood protection, Earthworks, Controlled drainage, Surface drainage, Drainage water, Surface runoff.
Identifiers: Injunctive relief.

This suit primarily concerned a common boundary line. The plaintiffs alleged that the defendant came on their side of the line and erected a levee which obstructed the natural drainage of the plaintiffs' land. The plaintiffs asked for a permanent injunction to prohibit the defendants from maintaining the levee. The plaintiffs also asked for crop damages caused by the flooding. The defendant affirmatively alleged that the plaintiffs dug a ditch across their lands to speed the flow of surface water and create a lake for duck hunting. The defencant maintained that the plaintiffs' damages resulted from the plaintiffs' failure to keep the ditch unobstructed. The defendant also claimed damages for the plaintiffs' cutting his dikes and levees which he contended were on the boundary line, destroying his rice crop. The court first fixed the boundary line and found that the flume protruded in some places on the plaintiffs' property. The court directed that the flume, and levee be

removed where it so infringed. The court stated that a landowner had the right to fend off surface waters by maintaining a flume and levee upon his own lands, but not on the land of others. (Sperling-Florida)
W74-05770

BEACH AND SHORE PRESERVATION ACT.
Fla Stat Ann secs 161.052, 161.141, 161.151, 161.161, 161.171, 161.181, 161.191, 161.201, 161.211 (Supp 1973).

Descriptors: *Florida, *Beaches, *Shore protection, *Beach erosion, *Riparian rights, Riparian land, Harbors, Piers, Coastal engineering, Legislation, Erosion control, Public benefits, Coasts, Erosion, Coastal structures, Piers, Beaches, Common law, High water mark, Boundaries(Property), Legal aspects, Public rights.
Identifiers: *Administrative regulations, *Coastal waters, Ingress, Egress.

Coastal construction by persons, firms, corporations or local authorities is restricted. All construction is prohibited within fifty feet of the mean high water line at any riparian coastal location. An exception may be obtained by filing an application showing engineering data, shoreline stability, storm tides, and the nature of neighboring structures. Piers may be built unless they will cause erosion. Additionally, these regulations are only applicable to sandy, not vegetative shores. Any coastal structure in violation of this act is considered a public nuisance. The statute also provides that beach restoration projects be undertaken if severe beach erosion has occurred, and if the beach will be destoryed in the immediate future. When such a beach is restored, the added land belongs to the state, but the common-law rights of riparians are preserved. No structure will be permitted to be built on the new land except those required for erosion prevention. Neither shall any use be permitted which may be injurious to the property or the landowners business or person. (Sperling-Florida)
W74-05771

WATER POLLUTION--PENALTY PROCEEDINGS.
Vt Stat Ann, Title 18, sec 1213. (1951).

Descriptors: *Vermont, *Legislation, *Water law, *Water quality control, *Water resources, Pollution, Water pollution control, Water purification, Water policy, Water pollution treatment, Waste water, Waste water disposal, Sewage treatment, Sewage disposal, Water treatment, Nuclear wastes, Water supply, Water wells, Spring waters.

A person who willfully dumps, deposits or places excrement, garbage, refuse, sewage, sewage sludge, radioactive wastes, petroleum products, or any poisonous substances into a water well or spring, whether the well or spring is in use or not, shall be fined not more than $5,000.00 or imprisoned for not more than five years, or both. This does not preclude the use of any disinfectant or other substance to improve the quality of the well or spring water for drinking. (Silber-Florida)
W74-05772

HEALTH-MUNICIPAL WATER TREATMENT PLANTS.
Vt Stat Ann Title 18 sec 1221 (1970).

Descriptors: *Vermont, *Legislation, *Water supply, Water utilization, *Water treatment, Water purification, Water resources planning, Water quality, Water quality control, Water management, Water conditioning, *Treatment facilities, Environmental engineering, Structures, Cities, Filtration, *Public health, Equipment.

After a public hearing, if it is found that any public water supply is likely to be contaminated, or if waters designated as Class A are reclassified by order of the water resources board, the board of health shall order the municipality or person using or supplying such public water supply to construct and install filtration and disinfection facilities in order to protect the public health or else convert to a new source of public water supply. Any such order shall specify a reasonable time schedule for such construction or conversion and shall specify and interim measures necessary for the protection of the public health. (Silber-Florida)
W74-05773

CHAMPLAIN BASIN COMPACT.
Vt Stat Ann tit 10 secs 171-172 (1967).

Descriptors: *Legislation, *Water law, *Water resources, *Vermont, Conservation, Scenery, Management, Water resources development, Water utilization, Natural resources, Water control, Waste disposal, Navigable waters, Dredging, Filling, Groundwater, Industrial water, Recreation, Resources planning, Lakes, Land use, Land development, New York.
Identifiers: *Lake Champlain basin.

The state of Vermont is authorized to join with the state of New York in a common effort to promote the sound development of the underdeveloped resources of the Lake Champlain Basin. The parties agree that the conservation, utilization, development, management and control of the water and related resources is essential for the public welfare. The commission created by the act shall act as a general forum for the problems of the region, devise solutions to these problems and implement intergovernment coordination and cooperation within the region. It shall also cooperate with the appropriate agencies in regional development, tourism, festivals, exhibitions as well as plan and recommend governmental services which will aid in the growth and prosperity of the region. The commission may also conduct water resources research including the relation of water to other resources, industrial water technology, ground water movement, water demand and general hydrological conditions. The commission shall design a plan for the development of the basin's resources to safeguard its scenic value, including the establishment of Lake Champlain Park. The commission may also regulate advertising, objectionable uses of property, dredging, filling, sewage disposal and navigation within the region. (Silber-Florida)
W74-05774

SOIL AND WATER CONSERVATION--FLOOD CONTROL.
Vt Stat Ann Title 10, secs 401-408 (1968).

Descriptors: *Legislation, *Control, *Coordination, Operations, *Benefit sharing, Administrative agencies, Administration, Conservation, Resources planning, Natural resources, Adoption of practices, *Vermont, Financing, Budgeting, Land, Water, Wildlife, Public health, Resources development.

The Vermont state natural resources conservation council was created to provide for the conservation, development and use of the natural resources of the state. The council may employ an administrative officer and such technical experts and other agents and employees as it may require. The council shall allocate funds to the various districts based on their operating expenses and individual conservation needs. The council shall also disperse the necessary funds needed to operate the various supervisory unions in facilitating their programs and operations. The districts and unions shall submit semi-annual fiscal and expenditure reports to the council. In addition, the council shall offer assistance to the directors of the districts and unions, coordinate interagency cooperation, secure the cooperation and assistance of the United States and any of its agencies. It shall also act upon petitions by any two or more districts lying within the limits of the territory proposed to be organized into a union. (Silber-Florida)
W74-05775

APPLICABILITY OF RULE OF STRICT OR ABSOLUTE LIABILITY TO OVERFLOW OR ESCAPE OF WATER CAUSED BY DAM FAILURE,
W. R. Habeeb.
51 ALR3d 965 (1973).

Descriptors: *Judicial decisions, *Dams, *Impoundments, *Dam failure, *Legal aspects, Water law, Structures, Facilities, Streamflow, Alteration of streamflow, Water rights, Riparian rights, State governments, Jurisdiction, Negligence, Water policy, Water control, Reservoirs, Damages, Floods, Flow control, Diversions, Washouts, Water storage, Water supply, Water distribution, Water demand, Water utilization, Water requirements, Water structures.

This annotation collects cases discussing whether a rule of strict or absolute liability may apply to overflow or escape of water caused by a dam failure. Generally, it may be said that the owner of a dam is not an insurer with respect to the condition of the dam and is not liable for damages caused by the overflow or escape of water if the dam should fail except on a showing of negligence. Strict liability is applied when mandated by a state statute and has also been applied where the owner of a dam built it in such a way that it automatically gave way during a flood and damaged neighboring property. Acts of God, if they are the sole cause, may be an excuse to escape from absolute liability. The doctrine of strict or absolute liability under these conditions was established in 1868 by an English decision, which still stands as a landmark holding in this field. Absent a statute requiring the application of strict liability, most jurisdictions require the showing of negligence or an omission of a duty by the owner of the dam. (Silber-Florida)
W74-05776

REGULATIONS CONCERNING WASTE DISCHARGE REQUIREMENTS, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W74-05777

AMERICAN WATERWAYS: FLORIDA OIL POLLUTION LEGISLATION MAKES IT OVER FIRST HURDLE,
Oregon Univ., Eugene. School of Law.
For primary bibliographic entry see Field 5G.
W74-05778

NO FAULT LIABILITY FOR OIL POLLUTION DAMAGE,
For primary bibliographic entry see Field 5G.
W74-05779

HIGHLIGHTS OF THE FEDERAL WATER POLLUTION CONTROL ACT OF 1972,
Morgan, Lewis and Bockius, Washington, D.C.
For primary bibliographic entry see Field 5E.
W74-05780

INTERNATIONAL IMPACT REPORTS AND THE CONSERVATION OF THE OCEAN ENVIRONMENT,
Syracuse Univ., N.Y. Coll. of Law.
For primary bibliographic entry see Field 5G.
W74-05781

ACCESS TO PUBLIC MUNICIPAL BEACHES: THE FORMULATION OF A COMPREHENSIVE LEGAL APPROACH,
R. S. Goldman.
Suffolk University Law Review, Vol 7, p 936-972, Summer 1973. 185 ref, 5 chart.

Descriptors: *Public rights, *Legal aspects, *Shores, *Beaches, *Cities, *Constitutional law, Recreation, Natural resources, Seashores, Coasts, Benefits, Local government, Water policy, Water demand, Water access, Water resources, Water resources development, City planning, Judicial decisions, Planning.
Identifiers: *Coastal waters.

The legal aspects of public access to municipal beaches are studied. In response to growing population and expanding industrialization, American society is presently facing increasing difficulty in providing adequate shoreline recreational facilities to meet the public need. In seeking to establish a public right to beach access, this note reviews the public trust doctrine and the doctrine of irrevocable dedication, both of which have been successfully used to protect user rights, however, the scope of each has been limited. The Constitution alone provides the broad applicability and substantive content necessary to support a successful attack upon discriminatory beach access fees. It appears that the right of public access to shoreline recreational resources is a fundamental right for the purposes of the equal protection clause and that, therefore, beach access fees should be examined with extremely strict judicial scrutiny. Even under the traditional, less stringent equal protection standard, exclusionary policies practiced by shorefront municipalities fail to pass the constitutional test. (Silber-Florida)
W74-05783

WHO GOVERNS LOCAL WATERS,
Miami Univ., Fla. Ocean Law Program.
D. Cowan.
University of Miami Sea Grant Institutional Program, Report No. C-1, Summer 1973. 20 p.

Descriptors: *Water control, *Water law, *Legal aspects, *Water policy, *Jurisdiction, Federal jurisdiction, State jurisdiction, Water rights, Coasts, Shores, Navigable waters, Political aspects, International agreements, Continental shelf, Structures, Pollution control, Environmental aspects, Erosion, Restoration, Hydroelectric power, Facilities, Cooperation, Coordination, Conservation, Management, Development, Channelization, Filling, Dredging.

It is essential to first determine which waters are internal and which comprise the territorial water areas of coastal states, both of which can be distinguished from the high seas which no nation politically controls. Coastal state jurisidiction over territorial waters extends, by international agreement, to the end of the continental shelf. Based upon the 'Commerce Clause' of the United States Constitution, federal jurisdiction extends to the wide range of activities and conditions related to all local, inland and coastal navigable waters. Within the federal scope is included navigation, waterfront construction, environmental water protection, restoration of eroded beaches, flood control, hydroelectric power operations and wildlife and recreational preserves. This federal control does not preclude state and local jurisidiction however. The Coastal Management Act of 1972 emphasizes federal, state and local cooperation in conservation and management of coastal regions. State and local control emphasizes building and developing aspects, filling and dredging, channelization, and control of water bottoms. (Silber-Florida)
W74-05784

LAFAYETTE PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commision on Coastal and Marine Resources, Baton Rouge.
For primary bibliographic entry see Field 2L.
W74-05785

LAKE CHARLES PUBLIC HEARING TESTIMONY.
Louisiana Advisory Commission on Coastal and Marine Resources, Baton Rouge.
For primary bibliographic entry see Field 2L.
W74-05786

BURKE V. COLLEY (QUIET TITLE ACTION INVOLVING ACCRETION).
495 S. W. 2d 699 (Mo. Ct. App. 1973).

Descriptors: *Accretion, *Legal aspects, *Surveys, *Missouri, Patents, Banks, Judicial decisions, Federal government.

Occupiers of land west of the Current River, a non-navigable stream, brought action against occupiers of land east of river to quiet title to certain land east of the river. Defendants claimed adverse possession and acquisition by accretion. The trial court rendered judgment for plaintiffs. The Missouri Court of Appeals reversed and remanded holding that a survey which failed to show that it commenced at a corner established by government was incompetent and inadmissible. The court applied the rule that when the United States surveyed its lands along the banks of the river and sold and conveyed such lands by subdivision, the government patent conveyed the title to all of the lands lying between the meander line and the middle thread of the river unless prior to the patent the government surveyed such lands as subdivisions or expressly reserved them when not surveyed. The court also found the defendants' evidence of adverse possession and accretion was wanted due to lack of proper survey. (Sears-Florida)
W74-05787

PASSAIC VALLEY COUNCIL V. HARTWOOD SYNDICATE, INC. (ACTION TO DETERMINE RIGHTS TO USE OF RESERVOIR).
348 N.Y.S. 2d 883 (Sup. Ct. 1973).

Descriptors: *New York, *Judicial decisions, *Water law, *Water rights, Prescriptive rights, Groundwater, Riparian rights, Relative rights, Competing uses, Reservoirs, Riparian lands, Water utilization, Regulated flow, Impounded waters, Water resources, Water management, Surface waters, Water supply, Recreation, Water storage, Reasonable use, Water allocation, Water demand, Easements.

This court action, under New York State law, was brought by the owner of a portion of a reservoir bed, under deed from a canal company. One of the defendants owned the remainder of the bed and claimed rights in the reservoir pursuant to the canal company's subsequent conveyance of the canal and appurtenances and the company's earlier grant of hunting, fishing and sailing rights. The Supreme Court for Sullivan County held that the company's deed, reserving the reservoir rights, created only an appurtenant easement, the rights in which expired when the canal was abandoned by the company, and that prescriptive rights were not thereby established. It also held that notwithstanding the decision above, the defendant's hunting, fishing and sailing rights were exclusive over the entire reservoir. However, the Court, in sustaining the defendant's exclusive rights to hunting, fishing and sailing over the entire reservoir, could not exclude the plaintiff's bathing and swimming rights in the area of the reservoir he owned. Nor were the defendants entitled to a determination that the owner of the remaining reservoir bed was not entitled to continue to overflow the defendant's lands. (Silber-Florida)
W74-05788

HAMILTON V. DIAMOND (PROCEEDING SEEKING TO HAVE PERMIT TO FILL HUDSON RIVER AT CERTAIN ADDRESS DECLARED ILLEGAL AND VOID).
349 N.Y.S. 2d 146 (Sup. Ct. 1973).

Descriptors: *Water resources development, *Landfills, *Planning, *Erosion control, *Land development, *Permits, New York, Legislation, Legal aspects, Land management, Water quality, Judicial decisions, Natural resources, Public health, Environmental effects, navigable rivers.

Petitioners sought to have a fill permit rescinded in the interest of environmental conservation. Owners of the property had obtained the permit in order to meet a local zoning ordinance and build a residence on the property. Public hearings were held and it was determined that the application was in the public interest and would not adversely affect the health, welfare, and safety of the State, nor its natural resources. The court found the determination neither arbitrary, illegal or an abuse of discretion. On the contrary, there was testimony to the effect that unkept, overgrown property would be developed, the littered shoreline cleared up and river water would be cleansed. Further, erosion would be reduced and the property's tax assessment would be quadrupled. The court also stated that there was no conflict between the rules and regulations of the Commissioner of Environmental Conservation and the provisions of the Constitution and the Environmental Conservation Law. (Sutton-Florida)
W74-05789

CUSTIS FISHING AND HUNTING CLUB V. JOHNSON (BOUNDARY DISPUTE AS TO TITLE TO BED OF A MILL POND).
200 S.E. 2d 542 (Va. 1973).

Descriptors: *Virginia, *Judicial decisions, *Legal aspects, *Riparian rights, *Boundaries(Property), Boundary disputes, Water law, Water rights, Adverse possession, Ponds, Spillways, Water levels.

The parties to this boundary dispute action were adjacent property owners. The Court held that the plaintiff could not establish a prima facie case for a presumed grant of the disputed portion of the pond by proving prior peaceful possession under color of title, since defendants were not mere trespassers, but owners of property adjoining the pond. The defendants thus had a colorable claim to riparian interests extending to the center of the pond. The plaintiff also did not establish adverse possession by employment of caretakers, the posting of no fishing signs, stocking the pond with fish, maintaining and repairing mill dam and spillway, and annually lowering and raising the water level, since such conduct was not inconsistent with the rights of defendants as riparian owners. In addition, the deed did not exclude riparian interests of owner by describing property line as extending along the line of mill pond, for in the absence of express exclusion by deed, an owner adjoining a freshwater pond acquires whatever interest in the pond which his grantor possessed. (Ritchie-Florida)
W74-05790

SCENIC RIVERS.
Va. Code Ann., secs. 10-167 thru 10-175 (1970).

Descriptors: *Virginia, *Water law, *Water policy, *Water utilization, *Conservation, Planning, Land use, Land development, Project planning, Fishlife, Wildlife, Recreation, Shores, Environment, Streams, Dams, Reservoirs, Water resources, Water resources development, Structures, Impoundments, Diversions, Channelization, Canals, Water control, Water quality, Water quality control, Legal aspects, Public rights.

The Scenic Rivers Act is established with the express legislative purpose to conserve rivers,

streams, runs and waterways and their shores and immediate environs. Preservation of certain rivers or sections of rivers for their scenic values is a beneficial purpose of water resource policy. The rivers of natural beauty and high quality should be included within the Act to assure their use and enjoyment for their scenic, recreational, geologic, fish and wildlife, historic, cultural or other values. In all planning for the use and development of water and related land resources including the construction of impoundments, diversions, roadways, crossings, channelization, locks, canals and other uses which change the character of a stream or waterway or destroy its scenic values, full consideration and evaluation of the river as a scenic resource shall be given before alternative plans for use and development are approved. (Silber-Florida)
W74-05791

DRAINAGE CODE--ENVIRONMENTAL VALUES.
Ill. Pub. Acts, ch. 78-495, sec. 1 (1955), to be codified as, Ill. Stat., ch. 42, sec. 4-15.1 (1955).

Descriptors: *Illinois, *Drainage, *Environmental effects, *Legal aspects, Legislation, Drainage effects, Drainage practices, Drainage programs, Erosion, Pollution, Habitats.

This amendment to the Illinois Drainage Code provides that in performing any of the duties and in exercising any of the powers provided in this Code, the commissioners shall use all practicable means and measures, including consideration of alternative methods of providing the necessary drainage, to protect such environment values as trees and fish and wildlife habitat, and to avoid erosion and pollution of the land, water or air. (Sears-Florida)
W74-05796

PENALTIES FOR WATER POLLUTION.
Ill. Ann. Stat., ch. 111 1/2, secs. 1042, 1043, 1044, 1046 (Smith-Hurd Supp. 1973), as amended, act 78-862, secs. 42, 43, 44, 46 (1973) Ill. Pub. Acts.

Descriptors: *Penalties(Legal), *Illinois, *Water pollution, *Environmental control, *Legislation, *Ecology, Law enforcement, Environmental effects, Administration, Abatement, Water quality control, Legal aspects, Pollution abatement, Sewage, Sewage treatment, Water pollution sources, Aquatic life, Waste disposal, Construction, Federal Water Pollution Control Act.

Illinois has enacted statutes providing penalties and fines for acts leading to water pollution. Each violation may result in a civil penalty of $10,000 and a further $1,000 fine for each day the violation continues, as well as payment to the State of a reasonable sum for death of aquatic life. Procedures are set forth by which the Attorney General can obtain injunctive relief against such persons who violate and continue to violate pollution statutes, specifically industrial users, and public sewage works. Authority is granted local law enforcement agencies to enforce the Act. All such violations are classified as misdemeanors. More severe criminal penalties are provided for persons who knowingly violate the provisions of this staute. Any public body created by State law and having jurisdiction over disposal of wastes which has been directed to abate any violation of this statute, shall acquire or construct such facilities necessary to comply with the directive. Any unit of local government operating sewage works may adopt regulations providing for cost-sharing by users of the sewage works, or payments by industrial users, if necessary in order to be eligible for federal grants under the Federal Water Pollution Control Act. (Sutton-Florida)
W74-05797

BIG CYPRESS CONSERVATION ACT.
Fla. Laws 1973, Ch 130, secs 1, 2 to be codified as, Fla. Stat. sec. 380.055.

Descriptors: *Florida, *State governments, *Federal government, *Legislation, Aquifers, Groundwater reservoirs, Groundwater recharge, Watershed management, Wildlife habitats, Water supply, Condemnation, Legal aspects, Federal reservations, Public lands, Parks, Regulation, Estuaries, Water management(Applied).
Identifiers: *Big Cypress Area.

The Big Cypress Area of Florida has a significant impact upon environmental and natural resources both in the state and regionally. The area is one of critical state concern as that term was employed in the Florida Environmental Land and Water Management Act of 1972. The area includes the Federal Big Cypress Fresh Water Reserve, along with contiguous land and water areas ecologically linked with Everglades National Park, the estuarine fisheries of south Florida, and the fresh water aquifer of south Florida. The precise boundaries of the area are to be determined by hearings. The statute also provides for the spending of forty million dollars for the acquisition of property in the area proposed as the Federal Big Cypress National Fresh Water Reserve. Any land acquired is to be donated and conveyed to the federal government, when Congress authorizes the acquisition of the Fresh Water Reserve. The Big Cypress Area is a water storage and recharge area, and is an integral part of the water management district of which the area is a part. The act authorizes the governor and the cabinet to exercise the power of eminent domain to acquire the necessary lands. (Sperling-Florida)
W74-05798

PUBLIC SERVICE COMPANIES--COOKING GAS AND WATER SERVICE.
Conn. Gen. Stat. Ann. secs. 19-65(Supp. 1972), as amended, Act 73-244, secs 19-65 (1973). Pub. Acts of Conn.

Descriptors: *Connecticut, *Statutes, *Public utilities, Water distribution(Applied), Water control, Water consumption, Legal aspects, Public rights, Administration, Public health, Social aspects, Legislation, Water, Water law, Water supply, Water rights, Water policy, Water utilization, Water allocation.
Identifiers: *Administrative regulations.

Connecticut requires that any building, or portion thereof occupied as a home, residence, office, or place of business, be furnished with hot water or water where the express or implied terms of the lease or rental agreement requires such a furnishing. Anyone failing to furnish such water is deemed to be interfering with the comfortable or quiet enjoyment of the premises and may be fined up to one hundred dollars or imprisoned not more than sixty days. No public service company, at the request of any lessor, shall cause the terminating of water service with respect to any leased property unless the lessor furnishes a statement signed by the lessee agreeing to the termination, or a notarized statement by the lessor that the premises are vacant. (Sperling-Florida)
W74-05799

JACK AND THE DRAGLINE,
For primary bibliographic entry see Field 2L.
W74-05804

PROPOSED CHATTOOGA NATIONAL WILD AND SCENIC RIVER, NORTH CAROLINA, SOUTH CAROLINA, AND GEORGIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Forest Service (USDA), Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05805

ENVIRONMENTAL QUALITY ANNUAL REPORT (3RD) OF THE COUNCIL ON ENVIRONMENTAL QUALITY.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-05807

ENVIRONMENTAL LAW--ZONING--ORDINANCE PROHIBITING FILLING OF WETLANDS ADJACENT TO NAVIGABLE WATERS, WITHOUT PERMIT IS CONSTITUTIONAL EXERCISE OF POLICE POWER NOT REQUIRING COMPENSATION.
Harvard Law Review, Vol 86, p 1582-1592, 1973. 56 ref.

Descriptors: *Wisconsin, *Judicial decisions, *Legal aspects, *Water law, *Regulations, Land use, Land development, Wetlands, Land control, Ecology, Environment, Environmental effects, Public policy, Legislation, State governments, Filling, Water policy, Riparian rights, Streams, Rivers, Lakes, Ponds, Channels, Land management, Land reclamation, Conservation, Natural resources, Permits, Zoning.

This article deals with the decision in Just v. Marinette County, 56 Wis. 2d 7, 201 N.W.2d.761 (1972), holding that an ordinance prohibiting the filling of wetlands adjacent to navigable waters without a permit is a constitutional exercise of the police powers and does not require payment of compensation. The Wisconsin legislature authorized countries to adopt zoning ordinances regulating the use of shorelands, defined as all lands within 1,000 feet of the normal highwater level of navigable lakes, ponds, and flowages, or within 300 feet of navigable rivers and streams. Subsequently the defendant, Marinette County, enacted this ordinance prohibiting the filling of more than 500 square feet of wetlands. The Wisconsin Supreme Court, reasoning that preservation of the wetlands is an important ecological requirement, held that to require that the owner be compensated for use restrictions imposed on wetlands makes preservation of such areas considerably less likely. It should be noted that other jurisdictions require compensation, keying on the notion that unless payment is made the ordinance is confiscatory. (Silber-Florida)
W74-05815

FEDERAL COMMON LAW IN INTERSTATE WATER POLLUTION DISPUTES,
For primary bibliographic entry see Field 5G.
W74-05816

ENVIRONMENTAL PROTECTION.
Conn. Gen. Stat. Ann. subsections 22a-1, 22a-5, 22a-6, 22a-7, 22a-12, 22a-28, 22a-29, 22a-30, 22a-32, 22a-36, 22a-38 to 22a-45 (Supp. 1973) as amended, act 73-571, subsections 1 to 6, act 73-590, section 1 (1973). Pub. Acts of Conn.

Descriptors: *Connecticut, *Environment, *Watershed management, *Erosion control, *Water resources, *Water supply, Water resources development, Legislation, Enforcement, Local governments, Permits, Inter-agency cooperation, Administration, Water rights, Water quality.

The very broad purpose of the statute is to conserve, improve, and protect Connecticut's natural resources and environment and to control air, land and water pollution in order to enhance the health, safety, and welfare of the people. The Commissioner of the department of environmental protection shall carry out the environmental policies of the state and shall have all powers necessary and convenient to discharge his listed duties. The Commission shall also adopt or amend environmental standards, criteria, and regulations, shall deal with complaints and conduct investigations

and hearing pursuant to said standard. A council on environmental quality has been created and shall submit annual reports concerning their activities. The act declares a state policy of preserving tidal wetlands which are being slowly destroyed. The Commissioner is given the right to inspect such tidal wetland areas at reasonable times and the regulated activities are dealt with concerning applications, permits and hearings if needed. Sections 22a-36 to 22a-45 inclusive are cited as the Inland Wetlands and Watercourses Acts and means to protect these indespensible, irreplaceable natural resources are provided and the statute lists various operations and uses permitted in the wetlands. Municipal participation is encouraged. (Sutton-Florida)
W74-05818

POTENTIAL DANGER FROM THE INDIAN CATFISH, HETEROPNEUSTES FOSSILIS (BLOCH),
California State Polytechnic Coll., Pomona. Dept. of Biological Sciences.
For primary bibliographic entry see Field 8I.
W74-05829

WATER SUPPLY PROBLEMS AND FUTURE RESOURCES,
Water Resources Board, London (England). Research Div.
For primary bibliographic entry see Field 6D.
W74-05864

WATER CONVEYANCE: LAWS, ORGANIZATION AND EFFICIENCY,
Colorado State Univ., Fort Collins. Dept. of Economics.
G. E. Radosevich.
Paper presented at the American Society of Civil Engineers National Water Resources Engineering Meeting, Jan. 29-Feb. 2, 1973, Washington, D.C. Meeting Preprint 1906, 21 p, 2 fig, 20 ref. OWRR B-083-COLO(4).

Descriptors: *Water law, *Water rights, Organizations, *Water conveyance, *Prior appropriation, *Institutional constraints, Legal aspects, Efficiencies, Water allocation.
Identifiers: *Legal constraints, *Western U.S.

Water in the western U.S. is allocated and distributed according to the prior appropriation doctrine. This doctrine was developed during the mid-1800's as a solution to conflicts arising between those competing for available stream flows. Few changes have occurred in the substantive or procedural aspects of this law, resulting in a lag between water management technology and the law's capability to incite implementation of these developments. The principal legal concept in the appropriation doctrine which has served as the constraint to effective adoption of more efficient practices within the water conveyance and use systems is the property right in water. The water right is at the heart of the doctrine. To resolve the water management problem in the West, recommendations are suggested for changing or reinterpreting the doctrine governing the exercise of this right. Four basic alternatives exist: do nothing; provide incentives within the legal framework; modify organizational capabilities; or enforce the law strictly. The recommendations will lead to implementation of more efficient water management technology in an attempt to solve the quantity and quality problems existing at the state, interstate, and international levels.
W74-05910

INDIAN WATER RIGHTS: LEGAL VARIABLES IN REGIONAL WATER MANAGEMENT,
California Univ., Los Angeles. School of Law.
G. D. Weatherford.
American Association for the Advancement of Science, 140th Paper presented at meeting, San Francisco, February 1974. 13 p.

Descriptors: *Water law, Indian reservations, Water policy, Water resources development, *Water rights, Pueblo water rights, Appropriation, Equitable apportionment, Legal aspects, Competing uses, Irrigated land, *Reservation Doctrine, Water utilization, Water management(Applied), Non-structural alternatives, Water distribution(Applied), Water allocation(Policy), *Colorado River Basin, Regional analysis.
Identifiers: *Indian Water Rights, *Navajo Indians.

The right of the American Indian to use water has been assumed to be protected by his reserved water rights, defined as furnishing the amount of water necessary to fulfill the purposes for which the affected reservation was created. The validity of this assumption is examined here by using the amount of irrigable land on the reservation as a yardstick. Even if not used currently, it is assumed to be set aside for future use. The actual judicial constraints of reserved water rights, however, are open to argument, with rights functioning as a license to wait, to bargain, or to litigate. When supply greatly exceeds demand, development of Indian water usage may safely be deferred in favor of non-Indian development, in effect being a license to wait, in the sense that Indian use of his apportionment will be exercised as his need arises. When supply is at a level where the Indian water right claim clouds the financial feasibility of a proposed non-Indian project, the Indian tribe can waive its water claim, or a portion of it, for a price, in effect a license to bargain. When such bargaining promises to be less beneficial than the application of the reserved water right, the tribe may litigate for the quantity of water involved, in effect a license to litigate. These three interpretations are discussed within the framework of the Colorado River Basin and the Navajo Indian tribe particularly. (Muller-Arizona)
W74-05922

SCIENTIFIC INFORMATION IN THE DECISION TO DAM GLEN CANYON,
California Univ., Davis. Dept. of Geology.
For primary bibliographic entry see Field 6G.
W74-05925

6F. Nonstructural Alternatives

GUIDELINES FOR DEALING WITH FLOODS ON HAY CREEK.
Army Engineer District, Philadepa.
For primary bibliographic entry see Field 4A.
W74-05532

EFFECTS OF URBANIZATION ON STREAM CHANNELS AND STREAM FLOW,
Regional Science Research Inst., Philadelphia, Pa.
For primary bibliographic entry see Field 4C.
W74-05534

FLOOD PLAIN MANAGEMENT.
For primary bibliographic entry see Field 6E.
W74-05755

FLOOD HAZARD ANALYSES, SAND CREEK, CITY OF COLORADO SPRINGS, AND EL PASO COUNTY.
Soil Conservation Service, Portland, Oreg.
For primary bibliographic entry see Field 2E.
W74-05860

FLOOD PLAIN INFORMATION-BACK CREEK IN ROANOKE COUNTY, VIRGINIA.
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 4A.
W74-05866

FLOOD PLAIN INFORMATION: NEUSE RIVER-ADKIN BRANCH, CITY OF KINSTON, NORTH CAROLINA.
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 4A.
W74-05867

INDIAN WATER RIGHTS: LEGAL VARIABLES IN REGIONAL WATER MANAGEMENT,
California Univ., Los Angeles. School of Law.
For primary bibliographic entry see Field 6E.
W74-05922

6G. Ecologic Impact Of Water Development

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF R. E. GINNA NUCLEAR POWER PLANT UNIT I, ROCHESTER GAS AND ELECTRIC CORPORATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05422

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CATAWBA NUCLEAR STATION, UNITS 1 AND 2, DUKE POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05423

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1, SOUTHERN CALIFORNAI EDISON COMPANY AND THE SAN DIEGO GAS AND ELECTRIC COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05424

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED LIMERICK GENERATING STATION, UNITS 1 AND 2, PHILADELPHIA ELECTRIC COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05425

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05426

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE HADDAM NECK (CONNECTICUT YANKEE) NUCLEAR POWER PLANT, CONNECTICUT YANKEE ATOMIC POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05427

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF GRAND GULF NUCLEAR STATION UNITS 1 AND 2, MISSISSIPPI POWER AND LIGHT COMPANY.
Directorate of Licensing (AEC), Washington, D.C.

For primary bibliographic entry see Field 5C.
W74-05428

NEPA IN THE COURTS: A LEGAL ANALYSIS OF THE NATIONAL ENVIRONMENTAL POLICY ACT,
Environmental Law Inst., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-05586

LIFE OF THE LAND V. BRINEGAR (ACTION TO ENJOIN SEAWARD RUNWAY FOR AIRPORT).
For primary bibliographic entry see Field 6E.
W74-05593

ENVIRONMENTAL IMPACT AND WATER DEVELOPMENT,
California Univ., Davis. Div. of Environmental Studies.
C. R. Goldman.
Journal American Water Works Assoc, Vol 64, No 9, p 545-549, September 1972. 4 fig, 10 ref.

Descriptors: *Water resources development, *Planning, *Social participation, Conservation, Methodology, Social values, Cost-benefit analysis, Decision making, Environmental effects, Preservation, Water quality, National Water Commission.
Identifiers: *Environmental quality, Public opinion, California Water Plan, Wisconsin Shoreland Protection Law, Skippack Watershed Project(Penn).

Changing attitudes on water development and environmental quality are surveyed. The last decade has seen the evolution of widespread public concern over environmental deterioration, bringing on a confrontation with development interests. The causes of this are briefly considered and recommendations to deal with this problem are evaluated. In order to incorporate contemporary attitudes into water development projects, environmental as well as developmental interests must be brought into all aspects of resource planning. Incorporation of public values and attitudes into the decision making process is vital to successful planning. To overcome citizen frustration, cynicism, and disillusionment resulting from lack of real public involvement, and the inadequate staffing of resource agencies, it is recommended that the planning of water projects be completely separated from the construction and regulatory agencies. Also, physical, biological, and social scientists should be part of the planning team together with the traditional engineering and economic input. Methodologies should include the incorporation of environmental quality factors into cost benefit analysis with emphasis on the maximization of social benefits. Simulation models, impact analysis, land use zoning, and resource inventories are new techniques which are beginning to be applied in this area. Examples of both positive and negative planning are cited. (Slattery-Wisconsin)
W74-05619

BIOLOGICAL MANAGEMENT AND CONSERVATION: ECOLOGICAL THEORY, APPLICATION AND PLANNING,
M. B. Usher.
Chapman and Hall: London, England; (Dist in USA by Halsted Press, a division of John Wiley and Sons, Ins: New York, N Y). 1973. 394 p. Illus. Maps. Pr $22.00.
Identifiers: Biological studies, *Conservation, Distribution, *Ecological theory, *Ecosystems, *Management, *Planning, *Scotland(Aberlady Bay region), Statistics, Publications.

Discussions are presented on various aspects involving biological management and conservation. An introductory section discusses the development of man, population and technology, the processes of change and legislative action. The remaining portion of the book is divided into 3 major sections. Part 1, ecological theory, discusses the distribution of organisms in space, the distribution of organisms in time, the concept of the ecosystem, classification of ecosystems and the response of ecosystems to exploitation. Part 2, application, discusses conservation and biological management, conservation and preservation, conservation and education and conservation and recreation. Part 3, planning, discusses the management plan and describes the Aberlady Bay Local Nature Reserve (Scotland) management plant. Two appendixes are also included containing the following information: matrix operations, including definition and names, addition and subtraction, multiplication, inversion and latent roots and vectors; and some commonly used statistics. An extensive list of references is included.--Copyright 1973, Biological Abstracts, Inc.
W74-05622

PARKLAND PLANNING AND LAKE MANAGEMENT IN THE ROCK RIVER BASIN.
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W74-05624

WATER MANAGEMENT AND THE ENVIRONMENT.
Organization for Economic Co-Operation and Development, Paris (France). Water Management Section Group.
Report 89771, 1973. 64 p, 1 fig, 42 ref.

Descriptors: *Administration, *Environmental effects, *Decision making, *Social participation, Social aspects, Social impact, Alternative planning, Flood control, Water resources development, Weather modification, Desalination, Inter-basin transfers, Nuclear powerplants, Long-term planning, Intangible costs, Measurement, Institutional constraints, Evaluation.
Identifiers: *Environmental impact, Matrix methods.

A report of the Water Management Sector Group of the OECD considers the environmental impact of water management decisions. A brief historic overview of growing environmental impacts and concomitant concern in the world is given. They may be partially explained by growth and change in technology, in world needs and demand, and in the advanced educational level of the public. Environmental impact and public involvement are discussed. Greater understanding of the former has been hindered by imperfect knowledge of the ecosystem, inabilities to quantify impacts, or to reconcile long-run and short-run effects. Suggestions are made to rectify these problems by development of requisite impact data, of models predicting man's impact on the ecosystem, and of gaining assurances that such data would become an integral part of the decision process. To accomplish these tasks, the use of matrix methods which plot environmental impacts, independent review boards, and adversative procedures are discussed. Improved public awareness and involvement to assure that the public interest is served and to avoid adverse reactions at a late stage of project development are emphasized. Recent trends including increasing use of alternative plans, studies of the choice process, and selected institutional changes and their impact on management decisions are described. (Schroeder-Wisconsin)
W74-05625

APPLICATION OF MICROECONOMIC MODELS TO REGIONAL ENVIRONMENTAL QUALITY MANAGEMENT,
Resources for the Future, Inc., Washington, D. C.
For primary bibliographic entry see Field 6A.
W74-05627

ECONOMIC GROWTH VS. ENVIRONMENTAL PROTECTION: WHAT WILL BE THE OUTCOME,
Wisconsin Univ., Madison. Dept. of Economics; and Wisconsin Univ., Madison. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6C.
W74-05644

ENERGY PRODUCTION AND ENVIRONMENTAL CONSEQUENCES,
Office of Science and Technology, Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-05645

ECONOMICS OF AQUACULTURE DEVELOPMENT,
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 6C.
W74-05646

LEGAL-ECONOMIC ASPECTS OF FISHERIES SESSION SUMMARY,
Louisiana State Univ., Baton Rouge. Law School.
For primary bibliographic entry see Field 6E.
W74-05649

FISHERY PROBLEMS AND THE U.S. DRAFT ARTICLE,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-05650

WILL SUCCESS SPOIL NEPA,
For primary bibliographic entry see Field 6E.
W74-05750

WILDERNESS PRESERVATION II: BRINGING THE CONVENTION INTO COURT,
Environmental Law Inst., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-05766

BIG CYPRESS CONSERVATION ACT.
For primary bibliographic entry see Field 6E.
W74-05798

CAN WE SAVE OUR SALT MARSHES,
Connecticut Agricultural Experiment Station, New Haven.
For primary bibliographic entry see Field 2L.
W74-05803

PROPOSED CHATTOOGA NATIONAL WILD AND SCENIC RIVER, NORTH CAROLINA, SOUTH CAROLINA, AND GEORGIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Forest Service (USDA), Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-05805

LITTLE RUNNING WATER DITCH WATERSHED PROTECTION, FLOOD PREVENTION, AND LAND DRAINAGE RC AND D MEASURE PLAN (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4D.
W74-05806

ENVIRONMENTAL QUALITY ANNUAL REPORT (3RD) OF THE COUNCIL ON ENVIRONMENTAL QUALITY.
Council on Environmental Quality, Washington, D.C.

Available from Sup Doc, GPO, Washington, DC, $2.00, and the National Technical Information Service as PB-211 960, $1.45 in microfiche. August 1972. 475 p, 66 tab, 4 map, 12 chart, 5 illus, 2 dwg, 13 photo, 3 append.

Descriptors: Environmental effects, *Governments, *Legislation, *Judicial decisions, *Water pollution, Human population, Distribution patterns, Water demand, Social aspects, Industrial wastes, Oil spills, Treatment facilities, Administration, Regulation, Foreign governments, Oceans, Marine biology.
Identifiers: *Environmental quality, Standing(Legal), *National Environmental Policy Act, Ocean dumping.

The status of and the trends in environmental quality are emphasized, and the interrelationships are examined of population, technology, pollution, and other factors that will shape the future environment. The year's (1971-1972) major developments at the international, federal, state and local levels are discussed. The impact of pollution control costs on fourteen industries as well as on the overall economy is described. A comprehensive analysis of the National Environmental Policy Act (NEPA) and a discussion of national parks are included. Specific coverage includes developments in the area of ocean pollution caused by the atmosphere, rivers, ships, and ocean dumping. There has been expansion at all governmental levels via legislation and regulations affecting water quality, marine sanitation, oil and hazardous substance spills as well as grants for waste treatment facilities. Recent results of judicial decisions including citizen's standing, agency action and industry plaintiffs are discussed. (Conko-Florida)
W74-05807

GATHRIGHT LAKE, JACKSON RIVER, JAMES RIVER BASIN, VIRGINIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-05808

BIRCH LAKE, BIRCH CREEK, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W74-05809

NEW MELONES LAKE, STANISLAUS RIVER, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W74-05810

UNDERGROUND NUCLEAR TESTING PROGRAM, NEVADA TEST SITE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Division of Environmental Affairs (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-05811

HAVASU INTAKE CHANNEL, HAVASU PUMPING PLANT AND BUCKSKIN MOUNTAINS TUNNEL, ARIZONA-NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 8C.
W74-05812

BEACH EROSION CONTROL PROJECT, DELRAY BEACH, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 8A.
W74-05813

CONSTRUCTION OF WASTEWATER FACILITIES, LUFKIN, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Federal Highway Administration, Austin, Tex.
For primary bibliographic entry see Field 5D.
W74-05814

WATER SUPPLY PROBLEMS AND FUTURE RESOURCES,
Water Resources Board, London (England). Research Div.
For primary bibliographic entry see Field 6D.
W74-05864

LAKE NORMAN DEVELOPMENTAL IMPACT STUDY,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 6B.
W74-05869

ENVIRONMENTAL QUALITY PLANNING - GOALS, POLICIES, AND OBJECTIVES.
East-West Gateway Coordinating Council, St. Louis, Mo.
For primary bibliographic entry see Field 6B.
W74-05876

SCIENTIFIC INFORMATION IN THE DECISION TO DAM GLEN CANYON,
California Univ., Davis. Dept. of Geology.
P. C. Perkins.
American Association for the Advancement of Science, 140th Paper presented at meeting, San Francisco, Feb. 1974. 32 p, 32 ref.

Descriptors: Colorado River, *Damsites, Dams, *Reservoirs, *Engineering structures, *Colorado River Basin, Rivers, *Arizona, Water resources, Water resources development, River systems, Geology, Hydraulic structures, Hoover Dam, Dam construction, Engineering geology, River regulation, Multiple-purpose reservoirs.
Identifiers: *Glen Canyon Dam.

In anticipation of legislative debates over authorization of the construction of a dam to block Glen Canyon, the environmental impacts of the creation of Lake Powell are examined in the light of subprojects of the current Lake Powell Research Project. They were considered also in the 1950's during the debate of the Colorado River Storage Project and even as far back as the 1920's at the time when Glen Canyon was discussed as a possible site for what became Boulder Dam and Lake Mead. The engineering and physical science considerations in the evaluation of the proposed dam are presented. A site evaluation, evaporation estimate, sedimentation analysis and bank storage estimate are included as are comparative developments along the Colorado River. (Muller-Arizona)
W74-05925

7. RESOURCES DATA

7B. Data Acquition

INVESTIGATIONS OF FRESHWATER SURFACE MICROLAYERS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W74-05410

SEMIAUTOMATED METHOD FOR MORE PRECISE AND SENSITIVE DETERMINATION OF NONPOLAR ANTICHOLINESTERASE INSECTICIDES WITH TECHNICON MODULES,
Ciba-Geigy Ltd., Basel (Switzerland). Agrochemical Div.
For primary bibliographic entry see Field 5A.
W74-05496

AN IMPROVED ION-EXCHANGE TECHNIQUE FOR THE CONCENTRATION OF MANGANESE FROM SEA WATER,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5A.
W74-05506

APPLICATIONS OF AERIAL PHOTOGRAPHY AND ERTS DATA TO AGRICULTURAL, FOREST AND WATER RESOURCES MANAGEMENT.
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
Available from NTIS, Springfield, Va 22151 as N73-31357 for $3.00 printed copy; $1.45 microfiche. Research Report 73-1, July 1973. 86 p. NASA Grant NGL 24-005-263.

Descriptors: *Remote sensing, *Infrared radiation, *Plant pathology, Diseases, Plant diseases, Fungi, *Mapping, *Aerial photography, *Data collections.

Remote sensing techniques were studied for use in detecting forest disease, determining water quality in peat, classifying forests, detecting saline soils, and surveying insect damage in corn and alfalfa. Infrared aerial photography used with density slicing techniques was the most successful of the methods studied for detecting crop damage. For crop identification and water-quality monitoring, small-scale infrared aerial photography can be very economical. (See W74-05516 thru W74-05521) (Knapp-USGS)
W74-05515

FOREST DISEASE DETECTION AND CONTROL,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
D. W. French, R. W. Douglass, and M. P. Meyer.
In: Applications of Aerial Photography and ERTS Data to Agricultural, Forest and Water Resources Management. Institute of Agriculture Remote Sensing Laboratory Research Report 73-1, Chapter 1, p 1-22, July 1973. 7 fig, 3 ref. NASA Grant NGL 24-005-263.

Descriptors: *Remote sensing, *Infrared radiation, Plant pathology, Diseases, *Plant diseases, Fungi, Mapping, *Aerial photography, Rots, Minnesota.
Identifiers: *Mistletoe infection, *Plant rot.

Dwarf mistletoe infections as small as 0.1 acre were visible on infrared color film at scales as small as 1:118,000. Detection of 0.1 acre centers was easy at scales of 1:31,680. Individual aspen trees killed by the hypoxylon fungus were detected with relative ease at scales of 1:6,000. Armillaria root rot in red pine was detectable only after the trees had died and the foliage had turned from green to brown. (See also W74-05515) (Knapp-USGS)
W74-05516

EVALUATION OF PEATLAND WATER TABLE ELEVATION AND WATER QUALITY INDICATORS,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
A. C. Mace, Jr.
In: Applications of Aerial Photography and ERTS Data to Agricultural Forest and Water Resources Management. Institute of Agriculture Remote Sensing Laboratory Research Report 73-1, Chapter 2, p 23-34, July 1973. 5 fig, 1 tab. NASA Grant NGL 24-005-263.

Descriptors: *Remote sensing, *Peat, *Water table, *Water quality, *Aerial photography, Infrared radiation, Mapping, Swamps, Wetlands, Sampling, Algae, *Minnesota.
Identifiers: *Chippewa National Forest(Minn).

Remote sensing techniques were evaluated for monitoring water table elevation of peatland areas for flood prediction and water quality changes. Density values of color infrared photography were significantly correlated with water table elevation. Correlation of film density with water table depth was not significant due to the undulating surfaces of peatlands. Identification of aquatic vegetation and population by image enhancement and density level slicing was not successful although sufficiently encouraging to modify sampling techniques. Large scale photography (1:3,000-6,000), precise location of sampling points, and time of sampling are modifications which should improve results. (See also W74-05515) (Knapp-USGS)
W74-05517

FOREST VEGETATION CLASSIFICATION AND MANAGEMENT,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
R. W. Douglass, and M. P. Meyer.
In: Applications of Aerial Photography and ERTS Data to Agricultural, Forest and Water Resources Management. Institute of Agriculture Remote Sensing Laboratory Research Report 73-1, Chapter 3, p 35-52, July 1973. 5 fig, 7 tab, 4 ref. NASA Grant NGL 24-005-263.

Descriptors: *Remote sensing, *Aerial photography, *Forestry, Infrared radiation, Forest management, Mapping, *Classification, Surveys, Land management, *Minnesota.
Identifiers: *Chippewa National Forest(Minn).

Foresters were able to classify vegetation species to an 85% level of accuracy on 1:120,000 color infrared fall photography. Accuracy was less with ordinary color photography and summer season photography (color and infrared color). Small-scale aerial photography for first stage (and, in some cases, second stage) multistage forest vegetation classification and sampling was very useful. Significant savings in aerial photo procurement and interpretation costs are possible for certain uses of very small-scale aerial photography in lieu of conventional (larger) scales of forest photography. (See also W74-05515) (Knapp-USGS)
W74-05518

DETECTING SALINE SOILS IN THE RED RIVER VALLEY, MINNESOTA, BY REMOTE SENSING TECHNIQUES,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
R. H. Rust, and B. H. Gerbig.
In: Applications of Aerial Photography and ERTS Data to Agricultural, Forest and Water Resources Management. Institute of Agriculture Remote Sensing Laboratory Research Report 73-1, Chapter 4, p 53-68, July 1973. 6 fig, 3 tab, 11 ref. NASA Grant NGL 24-005-263.

Descriptors: *Saline soils, *Remote sensing, *Infrared radiation, *Aerial photography, *Minnesota, Soil surveys, Mapping.
Identifiers: *Red River Valley(Minn).

Photo imagery was evaluated for detection and delineation of saline-affected soil areas in the Red River Valley of Minnesota. Two 10-mile transects crossing the common range of soil conditions were studies. Ground truth consisted of mapping the soils in the saline-affected area at a 1:20,000 scale and making conductivity measurements in grain and fallow fields in saline and nonsaline areas. Kodachrome 35 mm imagery was used to broadly outline affected areas. Density slicing techniques were employed on color infrared imagery in a qualitative analysis. After separation of cultural patterns, identification of saline-affected areas was greatly facilitated by image analysis. (See also W74-05515) (Knapp-USGS)
W74-05519

CORN DEFOLIATION SURVEYS,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
H. C. Chiang, and M. P. Meyer.
In: Applications of Aerial Photography and ERTS Data to Agricultural, Forest and Water Resources Management. Institute of Agriculture Remote Sensing Laboratory Research Report 73-1, Chapter 5, p 69-75, July 1973. 2 fig, 10 ref. NASA Grant NGL 24-005-263.

Descriptors: *Remote sensing, *Infrared radiation, *Plant diseases, Defoliants, Crops, *Corn(Field), *Minnesota.
Identifiers: *Defoliation, *Insect damage.

Remote sensing was studied for use in detecting crop-insect infestation by aerial photography of artificial defoliation in corn. Defoliation of plant tops was easily detected, while that on the base was less so. Aero infrared film with a Wratten 89B filter gave the best results. Morning flights at a scale of 1:15,840 are recommended. Row direction, plant growth stage, and time since defoliation were not important. Image enhancement significantly improved the threshold of defoliation recognition, but added a cost factor which may not be acceptable in terms of commercial remote sensing survey techniques. (See also W74-05515) (Knapp-USGS)
W74-05520

ALFALFA CROP PRODUCTIVITY ANALYSIS,
Minnesota Univ., St. Paul. Inst. of Agriculture Remote Sensing Lab.
D. K. Barnes, and M. P. Meyer.
In: Applications of Aerial Photography and ERTS Data to Agricultural Forest and Water Resources Management, Institute of Agriculture Remote Sensing Laboratory Research Report 73-1, Chapter 6, p 76-82, July 1973. 5 fig, 3 ref. NASA Grant NGL 24-005-263.

Descriptors: *Remote sensing, *Crops, *Alfalfa, Crop production, *Plant diseases, *Aerial photography, *Minnesota.

Sequential, ERTS-compatible multispectral, multiscale 70 mm aerial photography on a study area containing five varieties of alfalfa was studied to determine whether aerial remote sensing techniques could differentiate insect and disease injury. Visual analysis of 1:6,000 to 1:15,000 scale color infrared aerial photography could distinguish relative pest injury. An improvement in pest injury detection was found with image enhancement (density slicing) of the color infrared. There may be a correlation between film density readings and crop yields. (See also W7
W74-05521

MANUAL FOR ESTIMATION OF PROBABLE MAXIMUM PRECIPITATION.
World Meteorological Organization, Geneva (Switzerland).
For primary bibliographic entry see Field 2B.
W74-05524

THE DETECTION OF SUBSURFACE STREAM CHANNELS IN CARBONATE ROCKS BY GEOELECTRICAL METHODS,
Missouri Univ., Rolla. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 2F.
W74-05541

THE NATURAL MEDIUM AND SPACE,
K. Y. Kondrat'yev.
Available from NTIS, Springfield, Va 22151 AD-768 459 Price $3.00 printed copy; $1.45 microfiche. Air Force Systems Command, Foreign Technology Division Translation 24-704-73, 1973. 17 p, 1 tab.

Descriptors: *Remote sensing, *Reviews, *Satellites(Artificial), Photography, Infrared radiation, Radar, Microwaves.
Identifiers: USSR.

Remote sensing from satellites includes television, photography, heat observation in the infrared, and microwave radiometry. Photography in the visible range of the spectrum gives normal photographs and the television images which, presenting large sections of surface, are extremely informative for analysis of the distribution of cloud cover, vegetation, and geologic structures. Photography in the infrared region of the spectrum shows a picture of cloud distribution on the night side of the planet and makes it possible to judge the thermal state of the earth's surface. Microwave sensing makes it possible to determine the moisture and water content in the thickness of atmosphere, to detect icebergs, to estimate icy state and the surface conditions of the oceans. Radar is used to study the hydrographic network: to detect river systems, to determine the area of catchment, the perimeter of basin, the extent of tributaries, the slope of the slopes of valleys. In geologic studies, radar reveals the geologic structure and composition of bedrock. (Knapp-USGS)
W74-05544

METHODS OF MEASURING SOIL MOISTURE,
McMaster Univ., Hamilton (Ontario).
For primary bibliographic entry see Field 2G.
W74-05557

MICROWAVE RADIATION CHARACTERISTICS OF DRY AND MOIST GROUND COVERS,
For primary bibliographic entry see Field 2C.
W74-05558

BIG EYE IN THE SKY,
P. Briggs.
National Wildlife, Vol 9, p 35-38, February-March 1971. 4 photo.

Descriptors: *Aerial sensing, *Aerial photography, *Aircraft, *Satellites(Artificial), Cameras, Electronic equipment, Mapping, Spectrophotometry, Maps, Exploration, Exploitation, Terrain analysis, Colorimetry, Water pollution sources, Federal government, Deposition(Sediments), Flood control.

New sensing devices and high flying satellites present great promise in the fight to save resources. Hidden sources of pollution can be detected and new fresh water sources can be discovered. The key to this involves remote sensing. The most advanced cameras now used in aircraft research work have color sensitive lenses. Different plants, trees, etc. show up as different color signatures. Satellites are much cheaper to use than aircraft as they are not dependent on good flying weather and do not need a pilot. Aerial photographs enable one to map sediment deposition easily because the entire sediment plume can be seen at one time. Future satellite surveillance can reveal thermal pollution, tankers discharging oil waste, as well as floating algae and foam. Surveys of snow cover and melting patterns will make flood predictions more accurate. Changing water temperatures can also be detected as the temperature of the sea has marked effects on the weather. (Sperling-Florida)
W74-05581

TENSIOMETER-PRESSURE TRANSDUCER SYSTEM FOR STUDYING UNSTEADY FLOW THROUGH SOILS,
Idaho Univ., Moscow. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W74-05668

ESTIMATE OF THE ACCURACY OF DETERMINATION OF SNOW COVER CHARACTERISTICS AND RECOMMENDATIONS ON THE RATIONALIZATION OF THE SNOW MEASUREMENT NETWORK,
Main Geophysical Observatory, Leningrad (USSR).
For primary bibliographic entry see Field 2C.
W74-05844

AIRBORNE MEASUREMENT OF SNOW-WATER EQUIVALENT USING NATURAL GAMMA RADIATION OVER SOUTHERN ONTARIO, 1972-1973,
Geological Survey of Canada, Ottawa (Ontario).
For primary bibliographic entry see Field 2C.
W74-05853

HANDBOOK FOR MONITORING INDUSTRIAL WASTEWATER.
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
For primary bibliographic entry see Field 5A.
W74-05862

OXYGEN ANALYZER,
Lowrance Electronics, Inc., Tulsa, Okla. (Assignee).
For primary bibliographic entry see Field 5A.
W74-05909

GAMMA RADIATION FOR MEASURING WATER CONTENTS IN SOIL COLUMNS WITH CHANGING BULK DENSITY,
Royal Veterinary and Agricultural Coll., Copenhagen (Denmark). Hydrotechnical Lab.
For primary bibliographic entry see Field 2G.
W74-05930

7C. Evaluation, Processing and Publication

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS: VOLUME II--RECORDS OF WELLS, 1892-1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W74-05527

GROUND-WATER DATA FOR HARRIS COUNTY, TEXAS: VOLUME III--CHEMICAL ANALYSES OF WATER FROM WELLS, 1922-71,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W74-05528

EXTENDED PERIOD SIMULATION OF WATER DISTRIBUTION NETWORKS,
Systems Control, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 4A.
W74-05533

AN EMPIRICAL MATHEMATICAL MODEL OF AN INTERCONNECTED WATERSHED SYSTEM,
Pennsylvania State Univ., University Park. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 2A.
W74-05543

THE NATURAL MEDIUM AND SPACE,
For primary bibliographic entry see Field 7B.
W74-05544

BASE OF FRESH GROUND WATER--APPROXIMATELY 3,000 MICROMHOS--IN THE SACRAMENTO VALLEY AND SACREMENTO-SAN JOAQUIN DELTA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
C. F. Berkstresser, Jr.
Water Resources Investigation 40-73, 1973. 1 sheet, 1 map, 40 ref.

Descriptors: *Groundwater, *Saline water-freshwater interfaces, *California, Salinity, Water quality, Valleys, Deltas, Aquifers, Hydrogeology, Hydrologic data.
Identifiers: San Joaquin Delta, Sacramento Valley.

The base of fresh groundwater is delineated in the Sacramento Valley and the Sacramento-San Joaquin Delta, California. Changes in the altitude of the base of freshwater due to water-resources development can be monitored, and the freshwater zone can be considered in selecting sites for deep-well injection of liquid wastes. Also, altitudes of the base of freshwater can be used for groundwater model studies. About 4,000 chemical analyses were examined and 1,500 were used to corroborate information provided by 900 electrical logs. Fresh groundwater in the study area is contained almost exclusively in unconsolidated or poorly consolidated continental and volcanic deposits of Pliocene to Holocene age. The deposits have a maximum thickness of about 3,600 feet, but generally are much thinner. The surface of the base of freshwater is uneven and generally reflects the configuration of continental and volcanic deposits. Deeper geologic structures such as faults and gas reservoirs are rarely reflected in the shape of the base. Along the east margin of the valley, the basement complex of Mesozoic age delineates the lower limit of freshwater. Along the west margin, marine bedrock of Eocene age or older probably delineates the lower limit. In several parts of the valley, saline water zones are found near land surface. (Knapp-USGS)
W74-05553

THE WATER TABLE ON LONG ISLAND, NEW YORK, IN MARCH 1970,
Geological Survey, Mineola, N. Y.
For primary bibliographic entry see Field 4B.
W74-05556

WATER REQUIREMENTS OF ROSTERED IRRIGATION SCHEMES,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
For primary bibliographic entry see Field 3F.
W74-05667

DEVELOPING SIMULATION MODELS,
McMaster Univ., Hamilton (Ontario). Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 2A.
W74-05672

WATER TABLE AND SOIL MOISTURE PROBABILITIES WITH TILE DRAINAGE,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W74-05677

PROPOSAL FOR A PARTICLE-SIZE GRADE SCALE BASED ON 10,
Wisconsin Univ., Kenosha. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-05719

CLIMATIC DESCRIPTION OF DEW IN THE EUROPEAN USSR,
Main Geophysical Observatory, Leningrad (USSR).
For primary bibliographic entry see Field 2B.
W74-05839

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR DEEP CREEK, COLORADO RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2E.
W74-05851

PUBLIC WATER SUPPLIES OF NORTH CAROLINA: PART I. NORTHERN PIEDMONT,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 6D.
W74-05858

LONG-DISTANCE TELEMETRY OF DATA FOR FLOOD FORECASTING,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4A.
W74-05859

FLOOD HAZARD ANALYSES, SAND CREEK, CITY OF COLORADO SPRINGS, AND EL PASO COUNTY.
Soil Conservation Service, Portland, Oreg.
For primary bibliographic entry see Field 2E.
W74-05860

NATIONAL WEATHER SERVICE RIVER FORECAST SYSTEM, FORECAST PROCEDURES.
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 4A.
W74-05861

8. ENGINEERING WORKS

8A. Structures

RESERVOIRS, THEIR EFFECT ON NATURE AND THE ECONOMY, AND PRINCIPLES OF CONSTRUCTION (VODOKHRANILISHCHA, IKH VLIYANIYE NA PRIRODU I KHOZYAYSTVO, PRINTSIPY SOZDANIYA),
A. B. Avakyan.
Akademiya Nauk SSSR Vestnik, No 11, p 42-51, November 1973. 2 fig, 1 tab.

Descriptors: *Reservoirs, *Multiple-purpose reservoirs, *Reservoir construction, Reservoir storage, Usable storage.
Identifiers: *USSR.

Based on estimates made at the USSR Academy of Science's Institute of Water Problems, the total storage of 10,000 of the world's reservoirs already constructed or under construction is about 5,000 cu km or more than four times the average volume of water in stream channels (1,200 cu km). The useful storage is 3,000 cu km, and the area of the reservoir water surface is 400,000 sq km. According to data of the B. Ye. Vedeneyev All-Union Scientific Research Institute of Hydraulic Engineering, the Soviet Union has today about 1,000 reservoirs with a storage of more than 1 million cu m each. The total storage of these reservoirs is 831 cu km, and their useful storage is 406 cu km, which is about 16% and 13%, respectively, of the total and useful storage of the world's reservoirs. More than 98% of the total and useful storage of USSR reservoirs is concentrated in 150 reservoirs having a storage of more than 100 million cu m. By the year 2000 the total storage of the world's reservoirs will increase to 10,000-12,000 cu km and the useful storage will increase to 6,000-7,000 cu km.

Economic and social considerations which determine the need for reservoir construction include public water supply, irrigation, hydroelectric power, navigation, flood mitigation, and recreation. Global distribution of major world reservoirs with a storage of more than 10 billion cu m is mapped, and the total and useful storage of major world reservoirs with a storage of more than 30 cu km is graphed. Basic objectives in the study of problems relating to reservoir design and multipurpose use are outlined. (Josefson-USGS)
W74-05564

GATHRIGHT LAKE, JACKSON RIVER, JAMES RIVER BASIN, VIRGINIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-05808

BIRCH LAKE, BIRCH CREEK, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W74-05809

NEW MELONES LAKE, STANISLAUS RIVER, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W74-05810

BEACH EROSION CONTROL PROJECT, DELRAY BEACH, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
Available from National Technical Information Service, Springfield, Va, 22151, as EIS-FL-73-0414-F, for $5.00 paper copy, $1.45 microfiche. November 1972. 60 p, 1 map, 8 photo, 2 tab, 2 append.

Descriptors: *Environmental effects, *Dredging, *Erosion, Deterioration, Sediments, Fish, Sessile algae, Beach erosion, Atlantic Ocean, *Florida, Water quality, Federal government, Coasts, Comprehensive planning.
Identifiers: *Environmental Impact Statements, *Delray Beach(Fla), Coastal zone management.

This study deals with beach erosion in the Delray Beach to Boca Raton Inlet. The project consists of the restoration of three miles of Atlantic Ocean Shoreline in Florida. Periodic nourishment will be required to compensate for erosion losses throughout the fifty year life of the project. About 1.8 million cubic yards of material will be dredged from offshore and placed on the beach. The beach will be closed at this time. The dredging will temporarily degrade water quality, cause the beach to be temporarily closed to public use, and will destroy most benthic animals in bottom sediments and cover those in the beach nourishment area. This proposed plan is the only economically feasible one. Fish will be less affected by the project than the sessile invertebrates. The overall impact will probably be insignificant as the offshore borrow area is not near any productive reefs. Increased turbidity will only be of short duration. (Daniels-Florida)
W74-05813

ENGINEERING AND GEOGRAPHICAL PROBLEMS IN THE DESIGN AND OPERATION OF LARGE LOWLAND RESERVOIRS (INZHENERNO-GEOGRAFICHESKIYE PROBLEMY PROYEKTIROVANIYA I EKSPLUATATSII KRUPNYKH RAVNINNYKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 4A.
W74-05845

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS,
California Univ., Berkeley. Earthquake Engineering Research Center.
For primary bibliographic entry see Field 8E.
W74-05846

SHORELINE CONSTRUCTION FOR ARTIFICIAL WATER BODIES,
Stabilization Chemicals, Anaheim, Calif. (assignee)
J. H. Glenn.
U.S. Patent No. 3,768,266, 4 p, 5 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 5, p 1617, October 30, 1973.

Descriptors: *Retaining walls, *Concrete, *Shore protection, Water resources, *Erosion control, Plastics.
Identifiers: *Artificial water bodies.

Excavation of a trench to outline the periphery of the water body constitutes the first step in construction of the artificial shoreline. The dimensions of the trench may be adapted to specific requirements, although a depth of about 4 feet and a width of about 8 to 10 inches are the preferred dimensions of the trench. The flat side of a premolded plastic section of perhaps 8-15 feet in length is then secured to an upper portion of the trench sidewall, its opposite side being provided with surface irregularities or inequalities closely approximating natural sand or rock formations. The plastic section is thinner than the trench width so as to form an opening between the plastic section and the trench wall. Concrete is then poured into the trench through the opening and will first fill up the bottom portion of the trench below the plastic section and will thereupon occupy the opening in the trench opposite the exposed irregular surface of the pre-molded plastic section. The upper portion of the concrete will thus receive the mirror image of the irregular surface of the plastic section. The plastic section is readily removed from the trench and the irregular surface formed of concrete is exposed. (Sinha-OEIS)
W74-05882

SCIENTIFIC INFORMATION IN THE DECISION TO DAM GLEN CANYON,
California Univ., Davis. Dept. of Geology.
For primary bibliographic entry see Field 6G.
W74-05925

8B. Hydraulics

CELLULAR-BLOCK-LINED GRADE CONTROL STRUCTURE,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
B. P. Fletcher, and J. L. Grace, Jr.
Available from NTIS, Springfield, Va. 22151 as AD-766 692, Price $3.00 printed copy; $1.45 microfiche. Miscellaneous Paper H-73-7, August 1973. 23 p, 2 fig, 3 plate, 10 photo.

Descriptors: *Hydraulic models, *Drops(Structures), Canals, *Concrete structures, Channels.

A practical and inexpensive method of providing for a sudden change in grade of the invert of a trapezoidal channel in order to establish vertical control in a drainage basin subject to or experiencing gully scour was studied in a hydraulic model. A considerable cost savings can be realized if a cellular-block-lined structure can be used in lieu of a conventional reinforced-concrete drop structure. Cellular-block-lined grade control structures can be designed provided the geometric similarity is preserved, the control or throat section is sized sufficiently small to prevent excessive acceleration and drawdown of flow, and the following maximum or limiting conditions are not exceeded: an approach channel depth less than or equal to the exit channel flow depth; a critical depth of flow in the throat section less than or equal to 4.7 ft; a critical velocity of flow in the throat section less than or equal to 8.9 fps; and a total drop in the elevation or grade change less than 4.0 ft. (Knapp-USGS)
W74-05523

HOUSTONHANNEL, GALVESTON BAY, TEXAS: REPORT 1--HYDRAULIC AND SALINITY VERIFICATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
W. H. Bobb, R. A. Boland, Jr., and A. J. Banchetti.
Available from NTIS, Springfield, Va. 22151 as AD-766 693, Price $3.00 in printed copy; $1.45 in microfiche. Technical Report H-73-12, August 1973. 59 p, 4 fig, 42 plate.

Descriptors: *Hydraulic models, *Dredging, *Saline water intrusion, Salinity, Gulf of Mexico, *Channels, Canals, Inland waterways, *Texas.
Identifiers: *Houston Ship Channel(Tex).

The Houston Ship Channel model is a fixed-bed model constructed to linear scale ratios of 1:600 horizontally and 1:60 vertically. It is used to reproduce a portion of the Gulf of Mexico adjacent to the Galveston Harbor Entrance, the Galveston Bay complex, including Trinity Bay in its entirety, East Bay, a portion of West Bay, the Houston Ship Channel to its upstream boundary in the City of Houston, Texas, and Buffalo Bayou from the Houston Ship Channel turning basin to the confluence of White Oak Bayou. The model is equipped with necessary appurtenances for the accurate reproduction and measurement of tides, tidal currents, salinity intrusion, freshwater inflow, density effects, shoaling, and other important prototype phenomena. The purpose of the model is to determine if the cost of maintenance dredging can be reduced by proposed plans involving channel realignments, partial or complete diking of connecting bays, sediment traps, dikes in Galveston Bay, local contractions, enlargements, and other remedial measures. Model verification tests were conducted to make certain that the model hydraulic and salinity regimens were in satisfactory agreement with those of the prototype. The agreements attained are satisfactory; the model can be used to predict behavior of the prototype. (Knapp-USGS)
W74-05531

SELF-CLOSING IRRIGATION PIPE VALVE,
Agricultural Research Service, Fort Collins, Colo.
H. R. Haise, and M. L. Payne.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IR3, p 517-522, September, 1972. 5 fig, 5 ref.

Descriptors: *Irrigation systems, *Distribution systems, *Valves, *Remote control, Turnouts, *Pipe flow, Pipes, Irrigation engineering, Irrigation design.

A low-head self-closing hydraulic diaphragm irrigation valve that operates on water pressure in the pipe distribution system has been developed and successfully tested. The valve requires a pilot valve and control lines for remote operation. Pressure head in the system plus velocity head from a pitot tube, and the differential area of the valve, combine to make closure possible. Possible uses include control of reservoir outlets, water releases from riser valves, and routing water in storm sewers to maximize design capabilities. No outside power source is required. (Skogerbor-Colorado State)
W74-05670

MIXING OF SALINITY-STRATIFIED WATER BY PNEUMATIC BARRIERS. REPORT I: PRELIMINARY INVESTIGATIONS. HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 2L.
W74-05701

DESIGNS FOR RUBBLE-MOUND BREAKWATER REPAIRS NAWILIWILI HARBOR, NAWILIWILI, HAWAII. HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. A. Jackson, R. Y. Hudson, and J. G. Housley.
Available from NTIS as AD-762 184 PC$3.00, microfiche $1.45. Miscellaneous Paper No. 2-377, February 1960. 67 p, 26 photos, 24 plates.

Descriptors: *Hydraulic models, *Breakwaters, *Harbors, Hawaii, Attenuation.
Identifiers: Rubble-mound breakwaters, Kawai(Hawaii).

A 1:55.5 scale hydraulic model was used to obtain data from which competitive designs could be determined for the repair of the damaged breakwater at Nawiliwili Harbor, Island of Kauai, Hawaii. Proposed designs involved protective cover layers of either salvaged quarrystone, tetrapod, or tribar armor units. It was concluded that: it was not feasible to repair the damaged breakwater with the quarrystones available at Nawiliwili; repair sections constructed of either tribars or tetrapods would provide a stable breakwater; because the height of the selected breakwater crown is low compared with the height of the design waves, it will be necessary to protect the crown of the breakwater from overtopping waves with a concrete cap. The seaward face of the concrete cap should be vertical so that wave action will not wash armor units over the crest of the breakwater. (Sinha-OEIS)
W74-05705

LOCATION AND DESIGN OF WAVE ABSORBER, GARY HARBOR, INDIANA. HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. G. Housley.
Available as AD-760 936 PC$3.00, microfiche $1.45. Technical Report No. 2-509 Prepared for United States Steel Corporation, June 1959. 70 p, 8 fig, 8 tab, 8 ref, 17 photos, 18 plates.

Descriptors: *Hydraulics, *Bulkheads, Navigation, *Harbors, Indiana, Attenuation.
Identifiers: Wave absorbers, Gary(Indiana).

Hydrualic model tests were conducted to determine whether navigation conditions in Gary Harbor would be adversely affected by waves reflected from an adjacent vertical-wall bulkhead proposed for construction by the United States Steel Corporation, Gary, Ind. From tests of a 1:150 scale, fixed-bed model of the harbor, it was determined that the proposed bulkhead would reflect waves that would be hazardous to navigation, and that a 4450-ft-long rubble wave absorber would have to be placed along the structure to reduce the heights of reflected waves in the navigation channel to the level of the waves that now occur in the channel. For the waves used in this study an absorber composed of two layers of quarrystone armor units on a 1-on-3.2 slope is required to insure that the heights of waves reflected from the proposed bulkhead into the navigation areas would not be greater than 2 ft. (Sinha-OEIS)
W74-05706

DESIGN OF QUADRIPOD COVER LAYERS FOR RUBBLE-MOUND BREAKWATERS. HYDRAULIC LABORATORY INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. A. Jackson.
Available from NTIS as AD-762 185 PC$3.00 microfiche $1.45. Miscellaneous Paper No. 2-372, January 1960. 14 p, 2 tab, 4 photos, 3 plates.

Descriptors: *Breakwaters, Hydraulics, Structure, Shore protection.
Identifiers: Rubble-mound breakwaters, Quadripods, Armor units.

The information presented represents all test results concerning the stability characteristics of quadripod armor units available as of October 1959. The comprehensive testing program includes tests to determine the relative stability and efficacy of various special shapes of armor units for rubble-mound breakwaters. The stability and porosity of quadripods and tetrapods are essentially the same. Values for K sub delta (an experimental coefficient which is a function of the shape delta of individual armor units and the manner of placing them) and P (the porosity is a percentage) recommended for quadripods placed pell-mell with 2 layers was 8.3 and 50%, respectively. (Sinha-OEIS)
W74-05709

NIVIGATION IMPROVEMENTS IN BARNHART ISLAND-CORWALL ISLAND REACH, ST. LAWRENCE RIVER: HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
E. B. Lipscomb, and A. M. Gill.
Available from NTIS as AD-761 720 PC$3.00 microfiche $1.45. Technical Report No. 2-576, August 1961. 127 p, 3 fig, 55 tab, 29 plates.

Descriptors: Channel flow, *Channel improvement, St. Lawrence River, *Hydraulic models, *Nivigation.

The U.S. St. Lawrence Seaway Development Corporation resorted to hydraulic models to study the channels and other improvement features in the Cornwall Island reach. The investigations were concerned primarily with the improvement of South Channel, a reach about 7 miles long, to satisfy navigation criteria and also to assure continuation of the present 14-ft-draft navigation during construction of improvement plans. Interrelated with the South Channel improvement was the enlargement of North Channel to maintain the established discharge distribution and to obtain maximum benefits for navigation and power. Two models were used in the investigations. Plans were developed which would provide the desired 27-ft navigation depth in South Channel by widening the alignment of the channel on both sides and slightly deepening the natural bed in several places. Plans were also developed for compensating works in North Channel which would maintain the required natural distribution of flow between the channels with the South Channel improvements completed. Tests were made of the effects of various stages of construction of the improvement plans on 14-ft-draft navigation, and a construction schedule that would assure the continuation of navigation at this depth was developed. (Sinha-OEIS)
W74-05712

ABRASION IN PLACE: A MECHANISM FOR ROUNDING AND SIZE REDUCTION OF COARSE SEDIMENTS IN RIVERS,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 2J.
W74-05721

TWO-DIMENSIONAL ANALYSIS OF BACKWATER AT BRIDGES,
University of South Florida, Tampa. Dept. of Structures, Materials, Fluids.
For primary bibliographic entry see Field 2E.
W74-05734

FACTORS DETERMINING BED FORMS OF ALLUVIAL STREAMS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
For primary bibliographic entry see Field 2J.
W74-05735

WATER EXCHANGE IN TWO-LAYER STRATIFIED WATERS,
Royal Inst. of Tech., Stockholm (Sweden). Hydraulic Lab.
For primary bibliographic entry see Field 2L.
W74-05736

FLOW-INDUCED FORCES ON PROTRUDING WALLS,
Karlsruhe Univ. (West Germany). Institut fuer Hydromechanik, Staunanlagen und Wasserversorgung.
E. Naudascher, and F. A. Locher.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY2, Paper 10347, p 295-313, February 1974. 13 fig, 20 ref. ACE Contract DA-22-079-CIVENG-65-30.

Descriptors: *Hydraulics, *Loads(Forces), *Flow around objects, Flow separation, Fluid mechanics, *Hydraulic structures.

A two-dimensional wall of variable thickness protruding from a plane boundary is a basic geometrical configuration encountered in many instances of flow-induced structural vibrations in hydraulic structures. The characteristics of the dynamic forces acting upon the face of the wall parallel to the boundary were studied. The effects of cavitation and of forced periodic oscillations of the wall upon the force fluctuations were investigated as functions of cavitation number and amplitude and frequency of oscillation. There may be several control mechanisms for flow-induced vibrations because of flow reattachment, cavitation, or wall displacement. (Knapp-USGS)
W74-05737

FORM AND FLUVIAL PROCESSES IN ALLUVIAL STREAM CHANNELS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 2E.
W74-05819

THE MIXING CHARACTERISTICS OF SUMMERGED MULTIPLE-PORT DIFFUSERS FOR HEATED EFFLUENTS IN OPEN CHANNEL FLOW,
Iowa Univ., Iowa City. Dept. of Mechanics and Hydraulics.
For primary bibliographic entry see Field 5B.
W74-05821

VERTICAL MIXING OF HEATED EFFLUENTS IN OPEN-CHANNEL FLOW,
Iowa Univ., Iowa City. Dept. of Mechanics and Hydraulics.
For primary bibliographic entry see Field 5B.
W74-05822

THREE-DIMENSIONAL TURBULENT DIFFUSION FROM POINT SOURCES OF THERMAL POLLUTION IN A RECTANGULAR OPEN CHANNEL,
Delaware Univ., Newark. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W74-05823

RIVER-ICE PROBLEMS: A STATE-OF-THE-ART SURVEY AND ASSESSMENT OF RESEARCH NEEDS.
American Society of Civil Engineers, New York. Hydraulics Div.
For primary bibliographic entry see Field 2C.
W74-05824

HYDRODYNAMICAL STABILITY OF SALT WEDGE,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-05825

TURBULENCE IN WAKES OF ROUGHNESS ELEMENTS,
Blume (John A.) and Associates, Engineers, San Francisco, Calif.
C. K. Chen, and J. A. Roberson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10257, p 53-67, January 1974. 18 fig, 13 ref, append.

Descriptors: *Turbulent flow, *Pipe flow, *Roughness(Hydraulic), *Reynolds number, Drag, Fluid mechanics, Hydraulics, Shear stress, Turbulence, Pressure drag.

An experimental investigation was made of the turbulent flow in a pipe roughened with hemispheres. The roughness concentration was varied by changing the size of roughness elements which were uniformly distributed on the smooth boundary. Measurements included intensity of turbulence, macroscale of turbulence, Reynolds stress, mean velocity, pressure gradient, drag force, and shear stress on the smooth boundary. Turbulence and velocity measurements were confined to a vertical plane through the wake center line. In the region above the tops of the roughness elements the distributions of the normalized intensities of turbulence, the Reynolds stress, and the macroscale of turbulence in roughened pipe flow are about the same as in smooth pipe. In the region below the tops of the roughness elements at a given Reynolds number and for an increase in the relative roughness, there are corresponding decreases in the normalized longitudinal intensity of turbulence and the Reynolds stress. In the region behind the roughness elements at a given distance above the boundary, the maximum magnitudes of the normalized intensities of turbulence and the Reynolds stress have initially high values. They then decay and approach essentially constant values. The turbulence macroscale is dependent upon the Reynolds number and decreases with an increase in the relative roughness. (Knapp-USGS)
W74-05826

THREE-DIMENSIONAL TURBULENT WALL JETS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
N. Rajaratnam, and B. S. Pani.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10294, p 69-83, January 1974. 15 fig, 1 tab, 17 ref, append.

Descriptors: *Jets, *Turbulent flow, Hydraulic similitude, Shear stress, Boundary layers, Turbulent boundary layers, Hydraulics, *Nozzles.

Experiments on three-dimensional turbulent bluff wall jets originating from circular, elliptic, square, rectangular, and equilateral triangular nozzles show that in the region of fully developed flow, the distribution of the axial velocity in the central as well as transverse planes are similar. The velocity scale varies inversely with the axial distance whereas the length scales vary linearly with the axial distance from the respective virtual origins. The square root of the area of the nozzle serves as a convenient length scale in correlating the data for nozzles of different shapes. (Knapp-USGS)
W74-05827

HYDRAULICS AND THERMAL DISPERSION IN AN IRREGULAR ESTUARY,
General Electric Co., Philadelphia, Pa. Re-Entry and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W74-05828

DECAY OF MASS OSCILLATIONS IN RECTANGULAR BASINS,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
J-C. Shiau, and R. R. Rumer, Jr.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10261, p 119-136, January 1974. 10 fig, 2 tab, 14 ref, append. EPA Grant WP-00837.

Descriptors: *Seiches, *Hydraulic similitude, *Hydraulic models, *Lakes, Model studies, Waves(Water), Fluid friction, Mathematical models.
Identifiers: *Damping(Waves).

Decay of mass oscillations may be used to determine the scale of friction in a hydraulic model of closed basins. A mathematical model for the damping of the uninodal seiche in a rectangular closed basin utilizing the one-dimensional hydrodynamic channel equation was used as the analytic approach to the problem. Experimental data were compared with the analytical results. The similitude requirement for frictional damping requires equality of the Froude number and the Proudman number in the model and prototype. Through adjustment of boundary friction, model verification can be accomplished when these criteria cannot be met. (Knapp-USGS)
W74-05830

BUBBLY TWO-PHASE FLOW IN HYDRAULIC JUMP,
Toronto Univ. (Ontario). Dept. of Mechanical Engineering.
F. J. Resch, H. J. Leutheusser, and S. Alemu.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Paper 10297, p 137-149, January 1974. 11 fig, 1 tab, 6 ref, append.

Descriptors: *Hydraulic jump, *Air entrainment, Supercritical flow, Aeration, Critical flow, *Open channel flow.
Identifiers: *Multiphase flow.

Air-entraining roller zones are involved in hydraulic umps in open channels. Hot-film anemometry techniques were used to study these zones. The two phases (air versus water) were identified by a signal threshold. Data are presented on void ratio and average size and statistical size distribution of the entrained air bubbles for jumps with and without fully developed inflow. The state of flow development of the supercritical stream entering the jump has a significant bearing on the resulting flow configuration within the jump body and thus, on the air-entraining capacity of the hydraulic jumps. (Knapp-USGS)
W74-05831

DIFFUSION AND DISPERSION IN OPEN CHANNEL FLOW,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-05833

SEDIMENT TRANSPORT AT LOW SHIELDS-PARAMETER VALUES,
Norconsult A/S., Oslo (Norway).
For primary bibliographic entry see Field 2J.
W74-05835

HYDRAULIC FRACTURING IN ZONED EARTH AND ROCKFILL DAMS,
California Univ., Berkeley. Coll. of Engineering.
For primary bibliographic entry see Field 8D.
W74-05855

VORTEX CONTAINMENT OF SUBMERGED JET DISCHARGE,
Connecticut Univ., Storrs. Dept. of Mechanical Engineering.
R. L. Stoy, M. H. Stenhouse, and A. Hsia.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY9, Proc. Paper 9999, p 1585-1597, September, 1973, 8 fig, 12 ref, 2 append. OWRR/A-050-CONN(1), 14-0001-3807.

Descriptors: Hydraulics, *Hydrodynamics, *Jets, Buoyancy, Entrainment, *Vortices, Subsurface flow, Discharge(Water), Heated water, Powerplants.
Identifiers: *Fluid Flow, *Submerged jets.

The results of an experimental investigation of the discharge of submerged slot jet near a free surface are presented. In the thermal modeling of submerged power plant discharges, a vortex which appears between the jet discharge and the free surface or bottom surface is primarily responsible for jet deflection by causing a reduced pressure on one side of the jet. These results are compared to an analysis which is developed to predict the jet trajectory, velocity profile, and temperature profile and the effects of jet submergence, velocity, and buoyancy are studied. The unique feature of the submerged slot jet is the presence of a confined vortex which acts to move the jet to the surface. The conclusions are: a submerged slot jet may be used to contain a pool of heated water near the jet outlet because of the entrapped vortex; the Froude number is not a significant parameter while the submergence ratio and Richardson number are important in determining the jet path; and the jet path can be accurately predicted by the analysis which includes the effect of the reduced pressure caused by the vortex presence. (Dietchman-Connecticut)
W74-05912

8C. Hydraulic Machinery

HAVASU INTAKE CHANNEL, HAVASU PUMPING PLANT AND BUCKSKIN MOUNTAINS TUNNEL, ARIZONA-NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.
Available from National Technical Information Service, Springfield, Va, 22151, as EIS-AZ-73-0066-F, $1.45 microfiche. January 1973. 276 p, 19 fig, 6 tab, 22 map.

Descriptors: Environmental effects, Surface waters, *Intakes, *Pumping plants, Engineering structures, Tunnels, Tunnel linings, Water delivery, Flow, Specific capacity, Forebays, Sedimentation, Stratification, Inflow, Biota, *Arizona, *New Mexico.
Identifiers: *Environmental Impact Statements, *Lake Havasu(Ariz).

This project involves the construction of the Havasu Intake Channel, Pumping Plant and Buckskin Mountains Tunnel on Lake Havasu in Arizona. These facilities will enable water to be pumped from the Colorado River at Lake Havasu to the Central Arizona Project service area. A long-term average of 1.2 million acre feet of water

will be pumped annually from Lake Havasu for multiple-purpose uses. This new supply of water will be used to provide flexibility in meeting the demand for water imposed by municipal, industrial, and agricultural users. Construction of the project will have minimum effect on the environment of the construction site. The aesthetic value of the immediate area will be altered during construction and partially restored upon completion. The project will result in a minimal impact to the biota of the area. About 200 acres, mostly desert land, will be needed for construction. Alternatives considered included other diversion points, alternate water sources, alternatie power sources, selection of only individual segments of the project and no action at all. (Conko-Florida)
W74-05812

8D. Soil Mechanics

LANDSLIDES AND RELATED PHENOMENA PERTAINING TO HIGHWAY CONSTRUCTION IN OKLAHOMA,
Oklahoma State Dept. of Highways. Research and Development Div.
For primary bibliographic entry see Field 2J.
W74-05743

HYDRAULIC FRACTURING IN ZONED EARTH AND ROCKFILL DAMS,
California Univ., Berkeley. Coll. of Engineering.
E. S. Nobari, K. L. Lee, and J. M. Duncan.
Available from NTIS Springfield, Va. 22151 as AD-766 728 Price $3.00 printed copy; $1.45 microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Contract Report S-73-2, January 1973. 75 p, 29 fig, 14 tab, 14 ref. Contract DACW39-68-C-0078.

Descriptors: *Dam failure, *Dam design, *Stress analysis, Model studies, Rupturing, Engineering, Clays, Structural analysis, Structural design, Soils, Earth dams, Rockfill dams, Soil mechanics, Tensile stress.
Identifiers: *Hydraulic fracturing, Zoned dams.

The phenomenon of hydraulic fracturing in dams was studied under carefully controlled laboratory conditions. An analytical investigation determined the conditions under which the stresses in the cores of zoned dams is reduced sufficiently by arching so that hydraulic fracturing can occur. Analyses were also performed to examine the effectiveness of various countermeasures which can reduce the arching and the likelihood of hydraulic fracturing. Hydraulic fracturing involves tension failure, with formation of a crack or fracture on the plane of maximum tensile stress. The tensile strengths of clays and silts used as core materials are so small that they may be disregarded. Under conditions of nonuniform stress, hydraulic fracturing can occur progressively rather than suddenly. Initiation of hydraulic fracturing at the upstream face of the core in a dam thus does not necessarily mean that the fracture will propagate entirely across the core. Hydraulic fracturing is more likely in a high dam than in a low dam. The likelihood of hydraulic fracturing may be reduced by making the core wider, compacting the core at a lower water content, using transition zones which are less stiff than the shells, and using a sloping core rather than a central core. (Knapp-USGS)
W74-05855

8E. Rock Mechanics and Geology

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS,
California Univ., Berkeley. Earthquake Engineering Research Center.
A. K. Vaish, and A. K. Chopra.
Available from NTIS, Springfield, Va 22151, as AD-766 272 for $4.50 printed copy; $1.45 microfiche. Report No EERC 73-9, May 1973. 132 p, 42 fig, 1 tab, 36 fig. Army DACW73-71-C-0051.

Descriptors: *Earthquake, *Foundation investigations, Earthquake engineering, Computer programs, Seismic design, Structural design, Finite element analysis, Mathematical models.

A computationally efficient procedure for the linear earthquake analysis of structure-foundation systems is specially suited to finite element solutions of complex shaped structures on large, layered foundations. The procedure is very general in scope, being applicable to a large variety of structure-foundation interaction problems. An explicit formulation of the procedure is presented for a plane strain idealization of a dam foundation system. The procedure utilizes a substructure approach. The foundation is analyzed first, independently of the structure, to obtain its frequency dependent compliance characteristics at the connection nodes with the structure. Equations of motion for the structure are then written, in the frequency domain incorporating the effect of the foundation, the input to the problem being the freefield motion of the structural base. The substructure approach allows a more detailed modeling of the structure, at the same time resulting in a greater flexibility in the selection of the analysis procedure for the foundation and a greater efficiency in numerical computation. The frequency dependent equations of motion for the structure are solved very efficiently by transformation to a generalized coordinate system (Ritz Method), where a few generalized shapes can adequately express the structural response. It is shown that the normal mode shapes of an associated linear system--one that takes the static values of the foundation compliances--serve extremely well as the sought generalized shapes. A computer program performs the analysis. (Knapp-USGS)
W74-05846

8F. Concrete

INVESTIGATION OF POROUS PAVEMENTS FOR URBAN RUNOFF CONTROL,
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-05411

8I. Fisheries Engineering

SUMMER STORAGE OF ENERGY AND ITS USE FOR WINTER METABOLISM AND GONAD MATURATION IN AMERICAN PLAICE (HIPPOGLOSSOIDES PLATESSOIDES),
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology.
For primary bibliographic entry see Field 2L.
W74-05463

ECOLOGY OF FLOODPLAIN POOLS IN THE KASKASKIA RIVER BASIN OF ILLINOIS,
Illinois State Natural History Survey, Urbana.
For primary bibliographic entry see Field 2H.
W74-05536

BIOLOGICAL STUDIES ON THE FRESHWATER SHRIMPS IN KOREA: 4. THE ECOLOGY OF MACROBRACHIUM NIPPONENSIS (DE HAAN) (IN KOREAN),
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 2I.
W74-05583

FISHWAYS AT DAMS OR OBSTRUCTIONS.
For primary bibliographic entry see Field 6E.
W74-05603

ECONOMICS OF AQUACULTURE DEVELOPMENT,
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 6C.
W74-05646

SOME REMARKS ON AQUACULTURE,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 6C.
W74-05647

AQUACULTURE: ECONOMIC FEASIBILITY IN THE GREAT LAKES AREA,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W74-05648

FISHERY PROBLEMS AND THE U.S. DRAFT ARTICLE,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-05650

ALTERNATIVES TO THE CURRENT U.S. POSITION ON FISHERIES,
Miami Univ., Coral Gables, Fla. School of Law.
For primary bibliographic entry see Field 6E.
W74-05653

FOREIGN FISHING OFF THE SOUTHEASTERN UNITED STATES UNDER THE CURRENTLY ACCEPTED CONTIGUOUS SEA LIMITATION,
National Marine Fisheries Service, St. Petersburg, Fla. Southeast Region.
For primary bibliographic entry see Field 6E.
W74-05654

AQUACULTURE: PROBLEMS WITH THE PROMISE,
For primary bibliographic entry see Field 3F.
W74-05802

POTENTIAL DANGER FROM THE INDIAN CATFISH, HETEROPNEUSTES FOSSILIS (BLOCH),
California State Polytechnic Coll., Pomona. Dept. of Biological Sciences.
E. T Roche, and J. A. St. Amant.
Calif Fish Game. Vol 59, No 2, p 144-145. 1973.
Identifiers: Heteropneustes-fossilis, *Indian catfish, *California, *Catfish handling, *Fish imports(Illegal).

The dangers of handling Indian catfish are pointed out. It is illegal to import this fish into California. Nevertheless, these fish show up occasionally in shipments to fish dealers.--Copyright 1973, Biological Abstracts, Inc.
W74-05829

FISH ESCALATOR,
S. E. Ogden.
U.S. Patent No. 3,783,623, 4 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 918, No 2, p 577, January 8, 1974.

Descriptors: *Patents, *Fish passages, Dams, *Fish ladders, Conveyance structures, Fish migration.
Identifiers: *Fish escalators.

A fish elevator or escalator is designed to provide a means whereby fish may be passed through, over or around a dam. The elevator has a pair of parallel tubular passageways having one set of identical corresponding transverse dimensions and a second set of different corresponding dimensions. Endless chains are arranged in parallel

reaches with one reach extending along the midpoint of the adjacent side of one of the passageways and the other reach of the chain extending midway along the adjacent side of the other passageway. Corresponding reaches of the chains have partitions secured between them. The partitions are mounted so as to be slightly oscillatable and held in tight sliding engagement with the associated passageways. The elevator works somewhat in the manner of an undershot waterwheel with means provided to admit fish to be elevated to the higher level or lowered to the lower level into the compartments between adjacent partitions. (Sinha-OEIS)
W74-05903

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, FOURTH VOLUME.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 6A.
W74-05401

WATER QUALITY CRITERIA, SECOND EDITION.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5A.
W74-05417

OCEAN AND WATER RESOURCES ENGINEERING REPORTS COLLEGE OF ENGINEERING UNIVERSITY OF CALIFORNIA BERKELEY.
California Univ., Berkeley. Water Resources Center.
Available from NTIS as COM 73-11195 PC$4.50 microfiche $1.45. Archives Series Report No. 23, Prepared for NOAA, Office of Sea Grant, May 1973. 135 p. NOAA A/DC-1.

Descriptors: *Bibliographies, *Sanitary engineering, *Naval architecture, *Hydraulic engineering, *Water resources, *Desalination, Oceanography.

This compilation lists titles in those series related to ocean and water resources engineering which have been published in the College of Engineering, University of California, Berkeley, over the past thrity years. The compilation is arranged in sections according to office or laboratory from which the series emanated; arrangement within each section is sequential based on series report number. Separate author and subject indexes are provided. The offices and laboratories are identified as: Institute of Engineering Research, Sanitary Engineering Research Laboratory, Hydraulic Engineering Laboratory, Sea Water Conversion Laboratory, Naval Architecture, Committee on Ocean Engineering, and Waste Heat Management. (Sinha-OEIS)
W74-05707

WATER RESOURCES TECHNICAL INFORMATION SERVICES.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 10D.
W74-05739

10D. Specialized Information Center Services

WATER RESOURCES TECHNICAL INFORMATION SERVICES.
Australian Water Resources Council, Canberra.
Hydrological Series No 7, 1973. 69 p, 11 fig, 5 tab, 59 ref, 4 append.

Descriptors: *Information exchange, *Abstracts, *Australia, Information retrieval, Libraries, Publications, Documentation.
Identifiers: *Information centers.

The methods by which water resources technical information is disseminated in Australia and other countries were surveyed to establish the extent of the need for improvement of technical information services. The level of service provided by libraries in the water industry in Australia is low. This is the result of an inadequate number of professionally qualified librarians, an inadequate number of nonprofessional library personnel, and a low level of expenditure on library acquisitions and services. In general there is either a lack of recognition of the importance of scientific and technical information or a lack of understanding that a good library is an essential part of the means by which the information is obtained. Water libraries generally report to management at a level too low to be effective. It is proposed that a comprehensive information dissemination system be set up under the Australian Water Resources Council; the Council would be advised by a permanent committee on information services. A national water resources information center should coordinate the flow of information by the regular undexing of all documents acquired by the libraries in the system, act as a referral center for data, maintain information on current water research in Australia, and provide retrospective search and current awareness services. (Knapp-USGS)
W74-05739

10F. Preparation Of Reviews

WATER QUALITY CRITERIA, SECOND EDITION.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05A.
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Burke V. Colley (Quiet Title Action Involving Accretion).
W74-05787 6E

ACCUMULATORS (OIL)
Oil Accumulator,
W74-05688 5G

ACETYLCHOLINESTERASE
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☆ U. S. GOVERNMENT PRINTING OFFICE : 1974 O-LT - 542-959 (24)

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

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